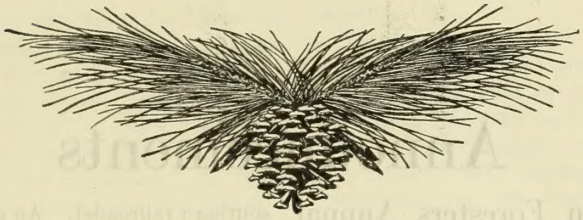
FOREST WORKER



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Announcements

Society of American Foresters Annual Meeting

The Society of American Foresters will hold its annual meeting in New Orleans, La., December 29, 30, and 31, in connection with the winter meeting of the American Association for the Advancement of Science. The opening session will be featured by a symposium on forestry in the South. Subjects on which talks are tentatively scheduled are the uses of aerial photography in forest mapping, aspects of the regional forest survey, the work of the Wisconsin Land Survey, erosion problems (discussed by a representative of the Bureau of Chemistry and Soils), the work of the Timber Conservation Board (discussed by the board's executive secretary), and the rôle of forest products in railroad revenue (discussed by the chief engineer of one of the southern railroads). An all-day field trip will be made to inspect the pine plantations, nursery, and sawmill of the Great Southern Lumber Co.

Special railroad rates will be available to registrants. Those planning to attend should notify G. H. Lentz, Southern Forest Experiment Station, 348 Baronne Street, New Orleans, La.

Central States Forestry Congress

The Central States Forestry Congress, organized last year at Indianapolis, will meet in Cincinnati December 3, 4, and 5. Alexander Thomson, of Cincinnati, is president of the congress. Communications in regard to the meeting should be addressed to the chairman of the program committee, C. Vivian Anderson, Union Trust Building, Cincinnati, Ohio.

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FOREST WORKER

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State Forestry

Forests in Southern Maine Now Protected From Fire

Forest fire protection activities have now been extended to 11 of the 16 organized counties of Maine, which occupy most of the southern half of the State. Previous to 1930, the State did not engage in such activities in any of the organized counties. These 16 counties include approximately 5,000,000 acres of forest land classed as in need of fire protection. In those where protection has been instituted the State is paying the salaries of fire wardens and is dividing the cost of fire tools equally with the towns. The towns are paying local wardens and are meeting suppression costs. The Federal Government is cooperating in the work.

In the unorganized counties forest protection work is handled by State officers exclusively, and is supported through a special 2¼-mills tax levied on all property in those counties. In 1929 the proceeds from this levy amounted to $169,000.

For the past five years, forest fires in Maine have burned over only about 0.08 of 1 per cent of the protected area yearly.

Slash-Disposal Measure Enacted by Wisconsin

A Wisconsin law of 1931 requires that all slash up to 4 inches in diameter resulting from timber-cutting operations within forest-protection districts be disposed of to a width of 50 feet from the edge of the right of way of any public highway or common carrier railroad or from the center of any main branch or main line logging railroad, and requires that large slash-covered areas be broken into blocks of not more than 640 acres each with firebreaks created by disposing of the slash to a width of 50 feet on each side of logging roads, logging spurs, portage trails, or other lines. It specifies also that slash must be disposed of to a width of 4 rods from the line of adjoining property bearing valuable forest growth.

The alternative methods of disposal for which the law provides are burning under permit, removal, and, in cases in which special authority is given by the conservation commission, lopping and scattering.

On cut-over areas this law requires the felling of all dead snags or stubs more than 8 feet high within the strips on which slash disposal is required and 4 rods beyond.

The law requires also that all slash resulting from clearing or brushing operations on the rights of way of public highways or public utilities within forest-protection districts be burned.

The slash disposal required is to be carried out concurrently with cutting or within a period to be determined by the State conservation commission, not exceeding one year. If agencies cutting timber fail to dispose of slash according to law the conservation commission may do the work and charge the cost against them.

Michigan Takes Stock of Results from 30 Years of State Forestry

Now that Michigan has been active in reforestation work for nearly 30 years, arrangements are being made for a checking over of the State's forests and forest-land affairs. A resolution adopted by the conservation commission June 12 requested that the chairman appoint a committee to inquire into the results of the reforestation work carried out by the State thus far and to recommend any needed modifications in plans and procedure. Those appointed by Chairman W. H. Loutit to form such a committee are Raphael Zon, director of the Lake States Forest Experiment Station; Samuel T. Dana, dean of the School of Forestry and Conservation, University of Michigan; P. A. Herbert, professor of forestry, Michigan State College of Agriculture; Harold Titus, member of the Michigan Conservation Commission; Earl W. Tinker, regional forester, Lake States Region; P. S. Lovejoy, in charge of technical operations for the Michigan Department of Conservation; and Marcus Schaaf, State forester of Michigan.

Oregon land classified for reforestation under special forest tax legislation has reached a total of 280,000 acres. In Clatsop County alone 108,000 acres, or more than 25 per cent of the county's area, has been classified.

Progress Report on Pennsylvania Plantations

Having made a special study of 106 forest plantations in 18 counties of Pennsylvania, George S. Perry and C. A. Coover, of the State's forest-research institute, have stated their tentative conclusions from the study as follows:

In the State as a whole the worst obstacle to successful establishment of forest plantations has probably been rank-growing weeds, such as goldenrods, or dense and tall growing grasses, such as timothy. Because of competition from such weeds and grasses, the poorest results from forest planting are usually shown by the most fertile and moist portions of the areas planted. Where forest planting has failed from this cause, large transplant stock should be carefully set out in large holes after the sod or roots have been stripped from a space about 2 feet square at each fail spot. District Forester Shirey suggests that a square yard of strong building paper be fastened around each of the trees used in reinforcing such fail spots, stones or earth being used to hold the paper in position.

In northwestern Pennsylvania and near Gettysburg, in Adams County, where the soil is fine, newly planted trees have often suffered severely from frost heaving. Fall planting should never be attempted on such sites. In Erie County very good results have been obtained when the soil has been drained by plowing rather shallow furrows and trees have been set on the edge of the furrow.

Trees of several species, including northern white pine and Norway pine, have shown remarkable persistence when planted under brush and broken natural forest cover. District Forester Dague has demonstrated in Clearfield County that "while there is life there is hope" for Norway pine, so far as suppression by shade is concerned. Cutting to liberate plantings of Norway and northern white pines has been justified by results. In general, care and attention given plantations during their first five years has been well repaid.

No really successful plantings of ash or oak have been studied.

Shortleaf pine shows very good results where planted in southeastern Pennsylvania and as far north and west as Williamsport.

Japanese black pine is apparently not suitable for forest planting in Pennsylvania. Japanese red pine grows thriftily but is almost universally multiple stemmed. Those few trees that have a single stem show excellent growth. It is hoped that with superfluous boles pruned away in early life the tree will prove to be a good grower and well adapted to the soils and climate of Pennsylvania.

Except where naturally propagated trees or brush are present, spacing wider than 6 feet does not seem advisable for any tree. Northern white pine, especially, requires close spacing for good growth. All the best plantings of this tree were spaced 4 by 4 feet; the least successful one was spaced 10 by 10 feet.

White pine weevil is the worst insect pest afflicting planted forests in Pennsylvania. It seems to do much less damage in close-spaced than in wide-spaced plantings. It sometimes attacks Norway spruce as severely as northern white pine and in some places does serious injury to Scotch, Japanese red, jack, and even shortleaf pine. This insect, except in one or two plantings, appears to be far less prevalent in 1931 than in 1928 and 1929. Sawfly larvæ have done considerable damage to the larches and hard pines. They seem to do greater injury at higher elevations and in portions of the State having a moist, cool climate. A planting of jack pine along the Frankstown Road near the summit of the Allegheny Mountains was wiped out by sawfly attacks.

The best-growing tree found was a European larch in a mixture of that species with northern white pine at Lucullus, Lycoming County. Planted in 1912, it is now 46 feet tall and 8.2 inches in diameter at breast height. The greatest height growth found to have been made in a single year was that of a northern white pine in the York Water Co. plantations near Jacobus, York County, which grew 5.4 feet during the 1928 growing season.

Messrs. Perry and Coover point out that these preliminary deductions are subject to revision in the light of further study of their data.

New York Plants 15,000,000 Trees on Newly Acquired State Land

Forest planting operations were carried out by the New York Conservation Department this spring on 30 separate tracts of land newly acquired by the State. The total area of these lands is 18,390 acres. The area actually planted, which includes all portions that were not already wooded and that were found to be adapted to reforestation, was 11,400 acres. More than 15,269,000 trees were used.

The cost of having the trees planted, by crews working under the five district foresters, varied by districts from $7.43 per 1,000 to $3.73 per 1,000. Where it was possible to use tree-planting machines the cost was only $2.80 per 1,000, compared to $5.84 per 1,000 if the planting had been done by hand. The State's labor bill was approximately $70,000 for the season's planting; in one week it reached a peak of $18,000.

On June 1 New Jersey opened to the public a park of 728 acres located in Salem County, about midway between the towns of Bridgeton and Vineland, known as the Parvin State Park. The tract is for the most part well stocked with old-growth oak timber and includes a 130-acre lake. Present options and contracts allow for enlarging it to 1,000 acres.

Georgia Creates Department of Forestry and Geological Development

Georgia has united its forestry and geology work under a commission of seven members, of which the governor is chairman ex officio. A change has been made also in the method of financing the forestry work. Heretofore supported with funds brought in by an occupational tax on lumber operations, State forestry activities are now provided for through direct appropriation. For each of the calendar years 1932 and 1933 an appropriation of $30,000 has been made.

A special appropriation of $40,000 has been made to the department of forestry and geological development to supplement an offer of the Chemical Foundation of New York to supply $50,000 worth of equipment for a semicommercial pulp mill to be used for research. Experiments will be made to determine the pulp-making possibilities of all pines and certain hardwoods native to Georgia. This research will be directed by Charles H. Herty, industrial chemist, who is a native of Georgia.

Texas Protection Area Now About 810,000 Acres

A seventh forest-protection unit has been formed in Texas, the Angelina County Lumber Co. and the Frost Lumber Industries having entered into agreements with the State forest service for cooperative protection of 70,000 acres of timberland in Angelina and southeastern Nacogdoches Counties. About 10,000 acres of this area is being made a part of protection unit 2. Altogether the seven units include about 810,000 acres.

Records for the calendar year 1930 show that approximately 3.1 per cent of the forest protection area of Texas was burned over in that year. Incendiarism was held responsible for 38.6 per cent of the area burned, and smokers for 35.7 per cent.

South Carolina to Extend Forest Protection and Introduce Forestry in Schools

South Carolina's forestry plans for the coming year include the organizing of three new protective associations controlling a total area of 115,000 acres before the beginning of the next fire season. Two steel lookout towers are to be erected on the property of existing associations. It is expected that more than 1,500,000 tree seedlings will be shipped from the State forest nursery during the coming winter.

Management plans have been prepared by the State forestry staff for 46 school demonstration forests, one in each county of the State. The plans involve planting, thinning, improvement cutting, measures to prevent erosion, and fire protection. Students in the vocational agricultural schools will carry out these management plans and will also collect forest tree seed and plant it in nursery beds.

As a forestry text to be used in the vocational agricultural schools State Forester H. A. Smith plans to bind 10 selected Federal and State forestry bulletins together with an outline of 18 lessons based on portions of these bulletins.

A forestry program for 4-H club boys has been prepared and will be followed out in two counties during the present year preparatory to its final adoption throughout the State.

Fire Protection Effective on Michigan State Parks

Only one forest fire has occurred on the State parks of Michigan since they were organized, states an August, 1931, report of the Michigan Department of Conservation. That one occurred on the Marquette Park, and is believed to have been of incendiary origin. At the Hartwick Pines State Park, containing one of the two remaining virgin pine plots in the Southern Peninsula, no smoking is permitted, and a firebreak surrounding the pines is patrolled constantly. At Dodge Brothers Park No. 5, at Commerce, an area planted with pines in 1927 is closed to the public. Three of the larger parks have fire towers, and all those containing timber stands of any consequence are equipped with telephones. In most of the parks no open camp fires are permitted, and in the others camp fires are permitted only on beaches or in open spaces designated by the department.

A new forest fire protection district is being organized in Jackson, Washington, and Scott Counties, Ind. According to the 1925 Census of Agriculture these counties contain 210,200 acres of idle or fallow land, woodland pasture, and woodland not used for pasture.

Completion of a 100-foot steel lookout tower in Columbus County, N. C., about 1 mile east of Chadbourn on State Highway No. 20, adds the twenty-second link to the State's proposed primary detection system of 125 towers. The site for the tower was given to the State by C. R. Bailey, of Chadbourn.

The second 100-foot steel lookout tower completed this year by the Maryland Department of Forestry was ready for service in July, near Quantico, Wicomico County. Woodland owners in the vicinity contributed $375 toward the cost of the tower. The Wicomico County commissioners contributed $300 and the use of tools and machinery.

Southern Cypress in Pennsylvania

A southern cypress (*Taxodium distichum*) 30 inches in diameter and 50 feet tall is growing on the Leonard farm a mile west of McAllisterville, Juniata County, Pa., reports Assistant Forester J. C. Kase, of the Bald Eagle forest district. The tree was planted in 1861 when the homestead was established, by a Mr. Leonard who traveled extensively through the South. Growing on the bank of a small stream, it has produced numerous knees 6 to 12 inches in height. This cypress is in a healthy condition, produces a bountiful crop of cones annually, and has withstood the rigors of the drought.

Other trees of the Leonard farm collection are a yellow-wood (*Cladastris lutea*) 16 inches in diameter, an umbrella magnolia (*Magnolia tripetala*), a coffeetree (*Gymnocladus dioicus*), and a fine specimen of Nordmann fir (*Abies nordmanniana*).

With a view to determining in what parts of Texas slash pine may successfully be planted, the Texas Forest Service has offered to supply timberland owners with free stock for planting this winter. The trees will be ready for planting about November 15. The maximum number to be given to an individual planter is 6,000. Additional quantities of slash pine, as of longleaf, loblolly, and shortleaf pine, may be purchased from the State for reforestation planting at the rate of $5 or less per 1,000 trees.

Twenty-one Vermont municipalities planted a total of 228,200 trees in the spring of 1931, the State forest service reports.

Forest trees distributed from New York's State nurseries in the spring of 1931 totaled about 33,000,000. Of this number 18,000,000 went to counties, organizations, and individuals.

Trees shipped from Ohio's State forest nurseries in the spring of 1931 totaled 3,569,855, setting a new record for the State. About half this number went to farmers, and 1,031,927 were planted on State lands.

New Jersey added 1,690 acres to its State forests in the quarter ending June 30, 1931. Income from the State forests for that quarter was $5,430.

On August 1, registrations of this season at 18 of the principal free public camp sites maintained by New York State in its forest preserve totaled 241,134.

New Jersey Transplant Digger

A sweetpotato digger has been adapted by the New Jersey Division of Forests and Parks for use in forest nurseries as a transplant digger. The machine is very similar to the ordinary 2-horse agricultural plow. The top half of the moldboard has been removed in order that instead of turning the plants under the soil the plow may merely throw them above the surface. The distance from point of share to beam, also, is about 8 inches greater than on the ordinary plow, enabling the operator to plow at a depth as great as 20 inches. The land side on the digger is 6 inches longer and 2 inches narrower than on the ordinary plow. With this digger it is possible to lift 10,000 transplants in 20 minutes.

Some of the adaptations of this machine were worked out by E. D. Anderson, of the State division of forests and parks.

New York Plans to Rear Many Quail

Plans have been adopted by the New York Conservation Department for large-scale propagation of native quail to restock the covers of the State. An incubator-brooder plant for propagating both quail and pheasants is to be developed at the State game farm at Middle Island, Long Island, heretofore used for propagating pheasants by the "range" system, in which chicken hens are used to hatch and brood the pheasants. More than 3,000 quail of the variety native to the State are being liberated this year. In previous years the conservation department has tried to increase the State's supply of quail by liberating trapped wild birds of the Mexican variety, but without satisfactory results.

The four New York State game farms this year obtained more than 200,000 eggs from their stock of pheasants. Approximately 40,000 eggs were set for hatching on the farms. The remainder were distributed to sportsmen's clubs and farm boys and girls who undertook to rear and liberate pheasants. More than 1,300 4–H club members received eggs and reared an average of 10 birds each to an age suitable for liberation, receiving $1 for each such bird.

Seventy citizens of Butte, Mont., mostly members of the local Rotary and Kiwanis Clubs, have volunteered to serve as State fire wardens and have been appointed as such by State Forester Rutledge Parker. Their duties are to report forest fires and violations of State or Federal forest fire laws and to warn persons found building fires in unsuitable places or leaving fires unattended.

An unusually good crop of longleaf pine seed is in prospect in Georgia this year, the State forest service reports.

Education and Extension

Farmers' Cooperative Does Good Business in Forest Products

The woods products department organized by the Farmers' Federation of western North Carolina in January, 1930, reports that in the year ending June 30, 1931, it shipped 275 carloads of forest products. This quantity included no chemical wood; the federation's shipments of wood of that type, though heavy in the spring of 1930, were discontinued at the end of six months for lack of demand. Shrubbery business showed a slight gain in the spring of 1931, with the shipment of 26 carloads.

The department is now working out a plan whereby it will be enabled to give seedling trees of pine and poplar and perhaps other woods to farmers who will undertake to plant and care for the trees and devote them to the development of salable timber.

Profitable Woodlands on Ohio Farms

Maple sirup from a grove owned by A. C. Beales near Burton, in Geauga County, Ohio, has brought in a gross revenue averaging more than $1.28 per tree per year for the past 20 years, Extension Forester Forrest W. Dean reports. In that time the 350 maples tapped have yielded 6,000 gallons of sirup, for which Mr. Beales received $9,000. The trees are still in excellent condition for producing sirup as well as wood.

Selection cuttings on a 20-acre farm woodland owned by a Mr. Wilcox, in Huron County, have brought a gross return of more than $1,000 in 10 years, leaving the most salable products in the woods. The Hathaway woods, a 30-acre area in Seneca County stocked with white ash, elm, red oak, sugar maple, basswood, and beech, which is valued at $4,000 or more at present market prices, has been the source of an income of $1,100 to its owner during a period of eight years through selective cutting of timber.

In addition to salable products, all these woodlands have been providing fire wood and building material for use on the farm.

When Mr. Dean laid out improvement-cutting plots in even-aged 60-year-old second-growth timber of mixed oaks, tulip poplar, and chestnut on a portion of the old Jefferson charcoal furnace lands, in Jackson County, he found that 25 oaks and chestnuts per acre could be removed with an average cut of four railroad ties per tree, leaving the bulk of the growing timber on the ground to develop into saw logs. The 200-acre woodland on which the plots were laid out was purchased 35 years ago by the present owner, a Mr. Gillen, for $3 per acre. During 1929 Mr. Gillen was offered $15,000 for the timber alone. He rejected the offer, preferring to cut the timber himself on a selection basis, making use of his team and equipment in producing railroad ties and hauling them to market.

Tree Planting in Nebraska

By CLAYTON W. WATKINS, Extension Forester of Nebraska

Although Nebraska is classed as a Plains State, and 50 years ago could boast of very few trees except along streams, approximately 6,000,000 trees are planted in the State each year for windbreaks, woodlots, parks, and land reclamation. From the very beginning of Nebraska's history trees have played an important part in the State's development, and to Nebraska statesmen goes considerable credit for some of the early national forestry legislation. It was natural that Arbor Day should originate in a State where its benefits would be most helpful; but the fact that Arbor Day observance has spread over the world is something in which Nebraska takes a great deal of pride. The Hon. J. Sterling Morton, founder of Arbor Day, established a living memorial in the trees which he planted on the grounds of his Nebraska city home, now maintained as a State park. This and many other early plantings have served as demonstrations inspiring others to improve their home surroundings.

Not a small part of Nebraska's annual tree-planting program is the planting of windbreaks and woodlots by farmers in cooperation with the Agricultural Extension Service. In the spring of this year 975,000 forest-tree seedlings and transplants were distributed for this purpose under the terms of the Clarke-McNary law. This cooperative planting has been growing since it was started in 1926. While some sections of the State have experienced adverse conditions during the last four years, in general the results are satisfactory. The survival for the 5-year period ending with 1930, as shown by reports from cooperators and field inspectors, was 52.3 per cent. This covers both evergreen and deciduous species.

Clarke-McNary stock is distributed about April each spring. While any number of trees from 100 to 1,000 may be applied for, the average is about 300 trees to a planting. Records show that a large number of the cooperators plant every year. Considerable time and thought are being given to farm-home beautification and development in Nebraska. Many counties are conducting definite programs with home improvement as a goal. This type of work sometimes fails to show immediate results, because of the comparatively slow growth of some plants and because of seasonal setbacks; but a 10-year program will show a

general improvement. Further, there is no danger of overproduction in a project of this kind, and since the expense for plant materials is so slight anyone can take part.

Nebraska is living up to her name "The Tree Planters' State."

Nebraska Evergreens Injured by Sharp Drop in Temperature

Planted evergreens in Nebraska have suffered severe damage as a result of a blizzard that occurred on March 26 and 27 of this year following an unusually mild winter, writes Extension Forester Clayton W. Watkins. Plantings of blue spruce, Douglas fir, western white spruce, lodgepole pine, and jack pine inspected by Mr. Watkins were completely defoliated. "In general the damage seemed to be to the leaves and buds which had begun to open, with little noticeable damage to twigs. Trees that were protected from the north and west suffered most in some cases, because this protection had stimulated early growth. Small newly-planted trees that were not fortunate enough to be covered with snow at the time of the storm suffered more damage than the older trees which were well established. In a few cases entire plantings of young evergreens were killed."

The trees affected had experienced lower temperatures during every winter of their lives except the last and had come through with normal health, declares Mr. Watkins; the injury was due to the suddenness of the change in temperature at a time when warm weather had prepared the trees to begin a new season's growth.

If North Carolina woodlands were thinned as they should be 50,000,000 cords of wood would be removed from them immediately, declares Extension Forester R. W. Graeber. Mr. Graeber estimates that farmers of North Carolina now use about 4,800,000 cords of fire wood annually, this quantity including 1,500,000 cords used for curing tobacco. He advocates increased use of fuel wood not only by farmers but by industries, schools, and other agencies.

A plan approved by the trustees of the New York State College of Forestry calls for combining the departments of forest recreation and landscape engineering to form a department of forest recreation and park engineering.

A course in conservation of natural resources is newly offered this year by the department of forestry of St. Lawrence University, Canton, N. Y. Floyd M. Callward, professor of forestry, will conduct the course.

North Carolina Sawmill Schools

Four "sawmill schools" held at scattered points in western North Carolina in July, 1931, by arrangement of county agents and Extension Forester R. W. Graeber were attended by nearly 350 sawmill operators, loggers, and timber owners from 15 counties. Attendance at individual meetings ranged from 51 to 125. The meetings, lasting one day each, were held at the mill of J. E. Thompson & Co., Hallsboro, Columbus County; at Bob Howell's sawmill, Troy, Montgomery County; at the lumber plant of the Snuggs Lumber Co. and the logging and milling operation of Watt Green, Oakboro, Stanly County; and at the plant of the Lenoir Lumber Co., Lenoir, Caldwell County.

C. J. Telford, of the Forest Products Laboratory, told how lumber quality can be improved by more accurate sawing and stacking, and how blue stain can be controlled. D. P. Price, sawmill expert with the E. C. Atkins Saw Co., answered questions on mill alignment, tension of saws, lead of the saw, etc. Tom Bearden, saw expert with the Atkins Co., demonstrated filing and fitting a crosscut saw and staged a log-sawing contest with eight teams of cutters. Mr. Graeber took the men on woods tours to study tree growth, methods of cutting, and fire damage.

New Jersey 4–H Forestry Clubs Growing Rapidly

By E. L. Scovell, Extension Forester of New Jersey

Interest in New Jersey's junior 4–H forestry club project continues to grow at a surprisingly rapid rate. Our chief difficulty this past year has been to provide local leaders and county supervision for new groups which desired to join the ranks. We have refused at least 25 groups their wish to be organized into junior 4-H forestry clubs this past year, because suitable local leaders could not be found or because it was impossible to spread the county club agents' time sufficiently to give these additional groups the supervision they needed to do effective club work. Never since the project was started in 1926 have we made an effort to solicit club membership.

At the present time (figures are quoted as of May 1, 1931), 2,943 New Jersey boys and girls are members of junior 4-H forestry clubs. They represent 61.1 per cent of the State's total 4-H club enrollment in agricultural projects, and about one-third of the total enrollment of both agricultural and home-demonstration projects. Eleven of the nineteen counties in the State having county extension offices now are cooperating in this project, and in three additional counties demands for the project have come from the people.

We credit this rapidly growing interest in our forestry project first to the fact that there is something about the "woods" which appeals to boys and girls, and secondly to the fact that instead of trying to teach boys and girls something which we wished them

to learn we took great care to find out what in the "woods" particularly interested each boy and girl and then helped them to find greater satisfaction in pursuing that interest.

We realize that we are conducting an experiment. Although our project has been making fine progress for six years and we have learned much in those six years, we comprehend the chance of encountering new and unlooked-for symptoms, and so reserve the experimenter's right of not offering a prophecy.

Ohio Trees Recover Well From Effects of 1930 Drought

Although forest trees planted in Ohio last year died in large numbers as a result of drought conditions, trees established prior to that year have on the whole recovered satisfactorily from the effects of the drought and have made normal growth this year, according to observations reported by the forestry department of the Ohio Agricultural Experiment Station.

On trees of some species, growth was normal in 1930. Well established Norway spruce plantations in northern Ohio made normal height growth, although very young plantings of this species showed unusual mortality. Young plantations of Norway pine and Scotch pine showed little more than normal mortality, and plantations of these species made approximately average height growth. In the spring of 1931 the growth of Norway spruce plantations which grew normally in 1930 was apparently about normal, and Norway and Scotch pines made fully average growth. Firs and hemlocks produced a height growth greater than usual, and larches grew very satisfactorily. Growth on hardwoods was about normal.

The forest plots and ornamental plants at the Wooster Arboretum showed more winter injury this spring than usual. As a partial explanation of this fact the station points out that in 1930 the dry summer was followed by a period of autumn rains, which stimulated plant growth at such a time that the trees had not yet become dormant when killing frosts occurred. In many cases severe injury resulted, which became more noticeable this spring when new growth started. Native deciduous shrubs showed this injury more than some of the evergreen ornamental specimens; the tips of their branches turned brown and died, and in some cases the entire plant died.

The flow of sap of the sugar maple stands in northeastern Ohio was about half normal this spring; the quality of sirup produced was better than usual. Bloom on ornamental shrubs seemed to be more abundant than ever, and seed crops on trees producing seed early in the summer were very heavy. Some trees producing heavy seed crops showed a thin and late-developing foliage.

Unusually favorable conditions existing in the spring of 1931 are largely credited with the normal growth observed in Ohio in this postdrought year. Forest tree seedlings planted this spring have grown exceptionally well. A suggestion passed along by the experiment station is to the effect that the unusual dryness of the soil last year induced abundant root growth which enabled trees to make normal growth this spring.

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Kansas Pasture Land Subjected to Burning Produces Less Vegetation Than That Not Burned

Five years' experimental burning of typically hilly bluestem pasture in eastern Kansas by the Kansas Agricultural Experiment Station has brought out evidence that burned pasture land yields less vegetation than unburned pasture. Different plots were burned at four different periods during the year—late fall, early spring, midspring, and late spring. The plot burned in the fall produced the least vegetation, and that burned in late spring produced the least quantity of weeds. Indications were found that in an average year the growth of vegetation begins slightly earlier on burned areas, but that in a cold, backward spring it is more advanced on unburned areas. Burning appeared to have little effect in the control of weeds and brush unless it was done as late as May 1. Burning late in the season showed a tendency to reduce the density of the stand of vegetation and increase the height of the top growth; it appeared, also, to encourage the growth of the coarser grasses. Little successional difference was observed in the vegetation on plots burned in early spring and midspring.

The southern forestry educational project conducted by the American Forestry Association in cooperation with the States of Florida, Georgia, Mississippi, and South Carolina was terminated June 30, 1931, at the completion of the 3-year program originally agreed upon.

A radio study group known as the Chaparral Club has been organized by the Conservation Association of Los Angeles County, Calif., primarily to develop interest in watershed protection. Regular broadcasts are made weekly, with naturalists as speakers, from a commercial radio station which gives this service without charge. Illustrated study leaflets on the more common trees and shrubs of the chaparral type are published by the conservation association and distributed free to members.

Ohio 4-H forestry clubs planted 225,000 trees this year. Thomas Funk, a Wayne County club member, set out in a nursery and in permanent plantings a total of 10,500 trees, of which 98 per cent were growing in midsummer.

Fire-Prevention Effort in Kalispell

How citizens of Kalispell, Mont., worked this summer to prevent forest fires is described as follows in an August 17 report by officers of the Flathead National Forest, which has headquarters in that place:

During each period of extreme fire danger practically every business house in Kalispell is inserting fire slogans and warnings in all its advertising in newspapers, over the radio, and in the movies. In addition the broadcasting station (KGEZ) reads special notices, prepared by us, at frequent intervals during its 12 hours of broadcasting, so that there is a fire-prevention announcement about every 15 minutes.

The owners of this station have offered us their facilities free of charge at any time, day or night, for as much time as we want. If it is after hours we have but to call the announcer and the operator and they will gladly go on the air. If we happen to be out of telephone communication with the field at any time, we can broadcast any important messages over station KGEZ.

The management of one of the local garages prepared a special notice regarding the ax and shovel requirement, with a fire slogan, and had it mimeographed by the chamber of commerce stenographer. It is distributing this to all cars that enter the garage, attaching it to all work sheets, and mailing it out with statements. The banks, also, are mailing these notices out with their statements, and many other business houses are mailing similar warnings with their monthly bills.

The newspapers are using fire slogans for fillers. They have written several editorials and also several front-page warnings for us.

In Kalispell every time one picks up a local paper or attends a picture show he sees plenty of fire-prevention pleas, and if one tunes in on KGEZ he can hear a fire announcement at any time of the day.

The Duke Forest, Duke University, Durham, N. C., has been elected a member of the International Union of Forest Research Organizations. It is the seventh institution in the United States to be admitted to the union, which at the end of 1930 had 54 ordinary and 3 associate members in more than 20 nations.

Correction: J. M. Tinker, and not Jack Thurmond as was stated on page 6 of the May, 1931, Forest Worker, is now one of two associate professors of forestry in the Georgia State College of Agriculture. Mr. Tinker is a 1924 forestry graduate of the college. Mr. Thurmond is district forester of the sixth district of Georgia, with headquarters at Savannah.

Forest Service Notes

Eroded Old Fields as Forest Sites

By Charles R. Hursh, United States Forest Service

The forest productivity of abandoned agricultural fields has been the subject of much debate. Observations on the more mature old-field forest stands in the Appalachian Mountains indicate that many of these stands show a satisfactory growth during the first decade or two followed by a decidedly unsatisfactory growth at the period when ordinarily a stand should begin to put on a substantial annual increment. A possible explanation for this slowing down of growth of the old-field stands lies in the fact that practically all the abandoned fields have at some time suffered severely from sheet erosion. In the great majority of cases this was doubtless the reason for abandonment, the owners having concluded that the capacity of the land for producing agricultural crops was practically exhausted.

It is commonly believed that continuous cropping "wears out" land through the removal of soil nutrients by the crops. Only rarely does the landowner take cognizance of the fact that in many cases unproductiveness of the soil is really due to the sheet erosion and surface washing that follow continuous cropping. There is little doubt that on sloping lands in regions of even moderate rainfall the loss of soil nutrients through sheet erosion is many times greater than that incurred through removal of nutrients by the crops.

Preliminary examination of a number of old-field forest stands in the southern Blue Ridge Mountains has indicated that the rich surface soil from 4 to 10 inches in depth was completely removed before the land was abandoned. As a result young trees became established upon a soil horizon that was in reality a subsoil possessing neither the desirable structural characteristics nor the available plant nutrients of the surface horizons that were lost through erosion during the period of cultivation. This subsoil is more acid than the normal surface horizons and contains no organic material.

No doubt much remains to be learned, also, about characteristics of root distribution and tree nutrition on eroded land and their effect on tree growth.

Old-field forest stands are becoming a factor in the forestry of the southern mountains and adjoining plateaus. Already considerable quantities of pulpwood are being cut from the shortleaf and Virginia pine stands that have become established on abandoned agricultural land in this region. In the plateau region abandoned fields may be considered potentially useful for growing timber for pulpwood, fuelwood, and farm needs. Each year much more land is abandoned than is cleared for agricultural use. Frequently this

abandoned land is menaced by erosion, and partly on this account foresters are urging its utilization for tree crops. Before dependable predictions can be made as to its productivity for such crops, however, it will be necessary that more information be obtained as to the site characteristics of the abandoned fields.

Soil Maps Used in Estimating Lake States Forest Type Areas

Soil maps of the Lake States, representing the results of work which soil surveyors of the Federal and State Governments have had in progress for the past 25 years, have greatly helped the Lake States Forest Experiment Station in estimating the areas of different forest types in its territory. Soil maps are available for about 10,000,000 acres of the northern part of the Lake States region. In the light of what the station has learned about relationships between soils and forest types these maps have effectively supplemented the results of road traverses, making it possible to arrive at reasonably accurate forest type area estimates with little expense of time and money. As a test of the dependability of this method, estimates of forest type areas thus arrived at for Ogemaw County, Mich., were checked with data obtained by the Michigan Land Economic Survey through direct mapping of the county. The discrepancy between the two sets of figures was less than 3 per cent for all forest types but two, and was only 5 per cent for those.

On the basis of road traverses and soil maps the experiment station estimates the areas of different forest types in the Lake States as follows: Aspen, 22,320,000 acres; hardwood, 9,150,000 acres; oak, 8,550,000 acres; jack pine, 3,810,000 acres; Norway pine, 295,000 acres; white pine, 275,000 acres; ash-elm, 2,160,000 acres; cedar-tamarack, 4,710,000 acres; and spruce-balsam, 2,500,000 acres.

Air Drying of Cones Cuts Seed-Extraction Costs

Two weeks' natural drying of northern white pine cones as a preliminary to running the cones through a seed-extraction kiln resulted in a saving of $43 per 100 bushels of cones in a test carried out by the Lake States Forest Experiment Station. One hundred bushels of cones that were air dried yielded 23 pounds of seed before kiln drying and 37 additional pounds after 19 hours in the kiln. The same quantity of cones placed in the kiln without preliminary treatment required 125 hours' drying and yielded 67½ pounds of seed. The difference in yield is not considered significant. Neither lot of seed showed an advantage over the other in germination. The moisture content of the seed from cones that received preliminary drying was higher than that of the other lot but not high enough to affect the keeping qualities of the seed.

Recurrent Fires Menace Douglas Fir Reproduction in Northwest

Slash fires on recently cut-over Douglas fir lands very often spread to adjoining areas previously burned, with the result that much of the logged-off land has not merely one burning immediately after logging but one or two reburns within the space of a few years. Five years' observations by the Pacific Northwest Forest Experiment Station on 301 natural reproduction plots on 22 cut-over areas in various parts of western Oregon and Washington indicate that the rate of reburn is about 5 per cent per year. Of the 15 areas that were visited by a second fire, 12 had at least a light stocking of seedlings and some had as many as 2,000 seedlings to the acre; now the reburned portions of these areas, with one exception, are practically without seedlings.

Not only is existing reproduction on cut-over Douglas fir land killed by a second fire, but following a second fire the probability of satisfactory seedling reproduction is usually much less than it was following the initial burn; seed trees have diminished in number through death or windfall, the edge of green timber has receded as a result of continued cutting, and site quality has been lowered through destruction of humus and shade.

Douglas Fir in Colorado Injured by Winter Killing

A marked setback has been experienced by Douglas fir within the Pikes Peak region, particularly on the Fremont experimental forest, near Colorado Springs, as the result of extensive winter killing of shoots and frosting of buds during the late winter and spring of 1930. On two experimental plots approximately half the trees give every appearance of eventually succumbing to the injury or at least becoming stag-headed. As a rule new growth in 1931, even though very good on normally developing trees, on trees especially hard hit has been meager and has been largely confined to the lower branches. As the growing season began to wane the tops of a large number of the trees appeared to be dying. This winter killing was experienced uniformly by all age classes; if anything, it seems to have been most severe in thrifty, more rapidly developing individuals approaching maturity.

An area of high and extremely rugged mountain country in the north-central portion of the Mount Baker National Forest, Wash., between the Baker and Skagit Rivers, has been designated as the Whatcom Primitive Area. It contains approximately 270 sections or 172,800 acres, of which approximately 22,000 acres is timbered, mainly with hemlock and true firs. Elevations range from 1,000 to 9,000 feet. Peaks abound, and the area is full of glaciers and rock masses.

Longleaf Pines Subjected to Thirteen Years' Light Burning Show Retarded Growth

By A. L. MacKinney, United States Forest Service

In order to determine how the growth of longleaf pine saplings is affected by annual controlled burning, still strongly advocated by many in the southern pine region as a means of forestalling disastrous fires and improving forest range conditions, experiments were started in 1916 at Summerville, S. C., by W. R. Mattoon and C. R. Tillotson. Fifty longleaf pine saplings, averaging 10 years of age and ranging from 1.3 to 9.3 feet in height, were tagged and measured on each of two contiguous areas. Since that time one of these areas, approximately 1 acre in size, has been burned over annually, and the other has been protected from fire with the result that it has not been burned except by one accidental fire of 1917.

The tagged trees were remeasured in 1919. All numbered trees that could be located were again remeasured in 1929 by C. F. Korstian and myself during the establishment of permanent sample plots on the burned and protected areas. At that time 29 trees were found still bearing tags on the annually burned plot, while on the protected plot only 16 tagged trees were identified.

Average values were computed for the diameter, height, and volume growth of these two groups of trees. Average height growth was computed for the 13-year period; diameter and volume growth were computed for the 10-year period 1919–1929 only, because diameter measurements were not taken in 1916. The significant data are presented in the following table:

	Year	Annually burned area	Protected area
Height (feet):			
Average	1916	5.0	6.1
	1929	29.9	37.1
Average total 13-year increment		24.9	31.0
Average annual increment		1.92	2.38
Deficiency on burned area		[1] .46	
Diameter at breast height (inches):			
Average	1919	2.57	2.63
	1929	5.47	5.82
Average total 10-year increment		2.90	3.19
Average annual increment		.29	.32
Deficiency on burned area		[2] .03	
Cubic volume peeled wood per tree (cubic feet):			
Average	1919	.204	.246
	1929	2.151	2.731
Average total 10-year increment		1.947	2.485
Average annual increment		.195	.249
Deficiency on burned area		[3] .054	

[1] 19 per cent. [2] 9 per cent. [3] 22 per cent.

Because so few trees were included in these samples it is of course possible that the difference in average growth of the two groups is due to a factor or factors other than fire. This is unlikely, however, since practically all the trees subjected to annual burning showed a lower height and diameter increment than the trees on the protected plot. Also, the difference of 22 per cent between the average annual volume increment per tree on the burned area and that on the protected area appears large enough to be significant.

Stand tables for the two plots which were established on the areas in 1929 show that at that time the annually burned plot contained only 61 per cent as many trees per acre as the protected plot. It is impossible to say that this difference in number of trees did not exist at the beginning of the experimental period; no data were taken on the number of trees per acre either in 1916 or in 1919. However, in the 1916 establishment report W. R. Mattoon stated that conditions on the two tracts were "quite similar." The present condition of the unburned stands which surround the annually burned plot on three sides strengthens the belief that stand conditions on the two plots were comparable at the beginning of the experiment.

It is believed, therefore, that the average height and diameter of the larger samples of trees measured in 1929 on the burned and protected plots, totaling 135 and 222 trees, respectively, reflect the effects of annual burnings more accurately than the data for the tagged trees. The average diameter at breast height of all trees on the annually burned plot was 4.4 inches, while that of the trees on the protected plot was 5.1 inches. The contrast here is stronger than may at first appear; the burned plot, having in 1929 a density of stocking only about two-thirds as great as that on the protected plot, should during some part of the experimental period have excelled the protected plot in diameter growth if conditions had otherwise been equal. The difference between the two plots in average height of trees is quite noticeable, 7.4 feet. If the trees on the two plots had the same average height at the time the burning experiment was started, those on the burned area have suffered a loss in average annual height growth of 0.57 foot per tree.

The volume of peeled wood in the stands on the two plots may be taken to represent a composite of the effects of fire on height and diameter growth. Put on an acre basis, in 1929 the stand on the annually burned plot contained 635.4 cubic feet, while that on the protected plot contained 1,306.1 cubic feet. If, as seems likely, the two groups of trees had an even start, the volume of wood produced on the burned plot falls short by 670.7 cubic feet per acre in 13 years, or 51.6 cubic feet per acre per year, of what it would normally have been.

Loblolly pine reproduction ranging from 1 to 14 feet in height occurs in an opening in the stand on the pro-

tected plot. On the annually burned plot there is not a single loblolly pine, although there is a hole in the stand comparable to the one on the protected plot. The annual fires have very effectively prevented the establishment of any tree reproduction.

Litter and humus are absolutely lacking on the annually burned plot, while on the protected plot the humus is about one-half inch deep and the litter from 3 to 5 inches deep.

The soil on the burned plot has a cover of grass with an approximate density of 0.8. In contrast with this the protected plot has no grass cover except in a small opening where the crowns of the loblolly pine reproduction have not closed; the presence of litter and humus and the greater density of the crown canopy over most of the plot have prevented the establishment of grass and herbaceous cover.

Seeding Characteristics of Western White Pine

Whatever contribution tree seed stored in the duff may make toward forest regeneration after logging in the western white pine type takes place in the first two years following logging, according to findings of the Northern Rocky Mountain Forest Experiment Station. With the exception of western white pine and possibly lowland white fir, the seed of none of the species present was found to be viable in any considerable proportion after one year's natural storage in the duff.

Cone-bearing western white pine trees killed by fire as early in the season as June were found to mature considerable quantities of seed, though the seed from such trees showed a lower viability percentage than that from normal trees.

Apparently good cones have been found on 10-year-old western white pines. Usually only three or four cones are borne the first year. The yield increases rapidly up to the age of about 45 years. After that it increases but slightly, and cones are borne only on the top of the crown even if the trees are open grown. Two pounds of seed is a heavy yield for a mature western white pine, whereas a mature western yellow pine may in exceptional cases bear as much as 60 pounds of seed.

Receipts from the national forests for the year ending June 30, 1931, are $4,992,945. This is $1,758,607 less than the receipts for the preceding year.

McHenry County, N. Dak., has bought 40 acres of land from the State and given it to the United States. The land will form the nucleus of an experimental forest which the Lake States Forest Experiment Station will use for planting investigations. The location is NW. ¼ NW. ½ sec. 36, T. 156 N., R. 78 W.

Contract Awarded for Construction of Forest Products Laboratory Building

A contract has been awarded by the Department of Agriculture for the construction of a new building for the Forest Products Laboratory, at Madison, Wis., to be completed in one year. The contractors are C. B. Fritz & Co., of Madison. This is the principal award under a $900,000 Federal appropriation to provide adequate quarters and equipment for the laboratory. Established by the Federal Government 21 years ago in cooperation with the University of Wisconsin for the purpose of research directed toward better utilization of forest materials and broader markets for forest products, heretofore the laboratory has occupied buildings owned by the university. For several years its work has required a staff of nearly 200 and has taxed available facilities.

For the new building the University of Wisconsin board of regents has provided a 10-acre building site overlooking Lake Mendota and the university campus.

The building will have six stories and a total floor space of 175,000 square feet. In general plan it will be U shaped. The design is modern, with emphasis on vertical lines and with large areas of glass in the external walls. Construction will be fireproof throughout.

A large group of dry kilns equipped for close control of temperature, humidity, and air circulation will be provided, for seasoning many species and types of wood. There will be a cold-storage chamber in which green logs and timber can be kept in unchanged condition, ready for experimental use at any time, and a number of humidity rooms in which wood can be brought to the exact moisture content desired for study under conditions simulating those of any season of the year or any climate of the Temperate Zone. Machines for testing timbers and framework up to a breaking load of 1,000,000 pounds will be served by cranes in a testing gallery accommodating pieces and panels as large as 30 feet high and 100 feet long. A special moisture-control room served by movable machinery will make it possible to test boxes and shipping crates at any degree of dryness or dampness that would be met in service.

The pulp and paper research laboratory, occupying six floors at one end of the building, will include grinder equipment, a digester tower 40 feet square, beating and refining apparatus, and an experimental paper machine with all moving parts under precision control. Provision is made for a large timber-preservation laboratory, a wood-fermentation unit, fractionating stills, and a general section of wood chemistry; for wood gluing, painting, finishing, and fireproofing laboratories; and for facilities for studying wood fungi and insect pests and methods of abating damage from these causes. Among unusual features of the building will be an ultraviolet-ray chamber, where wood can be sterilized for mycological studies and where paints and other materials can be exposed for test; an X-ray

room providing for examination of the minute structure and growth characteristics of wood; a microphotographic studio; and a stone table and shaft for ultracentrifuge apparatus to be used in determining molecular sizes of cellulose and other wood components.

Facilities planned to serve this establishment include a railway siding, a power plant of 630 boiler horsepower, and a number of service elevators, hoists, and monorails. Direct and alternating electric current at various voltages will be supplied to workrooms, and steam at high and low pressures will be piped to processing apparatus. Chemists' benches will be supplied with water, gas, compressed air, steam, and electricity. A forced ventilation system will be used for chemical hoods, pulp digesters, and other units as required. A sawmill, planers, and a complete woodworking shop will be available for preparing test material in all sizes, shapes, and forms of construction needed. A room will be equipped for barking, chipping, and grinding wood for experimental pulping and paper making.

Bark Thickness and Bark Volume of Western Yellow Pine

By Walter H. Meyer, United States Forest Service

Trees show peculiar differences when it comes to putting on a protective coating of bark. Some species have extremely thick layers and others have extremely thin ones. Bark thickness affects the art of tree climbing, as the poor wretch who has to do the climbing must allow for the thickness and scaliness of the bark by having sufficiently long spurs on his climbers. In the case of western yellow pine, for which a growth and yield study has been in progress for the past three years in the North Pacific Region, it has only lately been appreciated that the volume of the bark is equivalent to from 20 to 30 per cent of the actual wood volume, or that the thickness of the bark is from 12 to 18 per cent of the total diameter at breast height outside bark. Many such relationships were worked up as a necessary part of a study of the form and volume growth of western yellow pine trees involving measurements on almost 3,500 trees of all types and classes.

As the diameter of the tree increases the bark becomes thicker but forms a progressively smaller proportion of the diameter. The trend of bark thickness in relation to diameter shows no significant variation in any of the immature tree classes (1, 2, and 6) or the mature tree classes (3, 4, and 7) by Dunning's system. On the whole, however, the immature classes have slightly thicker bark, by a few tenths of an inch, than mature trees of the same size. The overmature trees, class 5, have materially thinner bark at breast height, in proportion to diameter, than any of the other classes. On the average the immature and mature trees have a 2-inch double bark thickness for a 12-inch breast-height diameter, increasing to a 5-inch double bark thickness at 40 inches, while the overmature trees have a 2.5-inch double bark thickness at 20 inches breast-height diameter running up to 4 inches at 40 inches diameter. These trends and values, with many others, are shown in an office report titled "Bark thickness and bark volume of western yellow pine," lately prepared at the Pacific Northwest Forest Experiment Station as a by-product of the growth and yield study of this species.

A Little-Known Oak of the Southern Bottomlands

By Henry Bull, United States Forest Service

It seems remarkable that a distinctive species of oak common throughout an important forest region of the United States could remain unclassified and apparently entirely unknown until as late as 1927. Yet if one were to go into the bottomlands of the lower Mississippi River Valley (i. e., into the so-called Delta regions of Louisiana, Mississippi, and Arkansas) armed with such formidable authorities on dendrology as the latest (1926) edition of Sargent's manual, Hough's manual, and Sudworth's latest check list (1927) and with various popular or semipopular bulletins describing forest trees of the Southern States just mentioned, he would continually be confronted with an oak for which his armful of dendrology texts provided no description. The puzzling oak would be Quercus nuttallii (Palmer), the original description of which was made by Ernest J. Palmer of the Arnold Arboretum, Harvard University, in 1927, in the Journal of the Arnold Arboretum (vol. 8, no. 1). As yet no common English name has become attached to this oak.

Quercus nuttallii was named in honor of the famous naturalist Thomas Nuttall (1786–1859). On one of his trips through the bottomlands of Arkansas, Nuttall listed Quercus coccinea, scarlet oak, among the trees seen. True Quercus coccinea is not found in the Arkansas bottomlands; evidently the tree referred to was that now known as Quercus nuttallii, which in certain respects is not dissimilar to Quercus coccinea.

Various English names have been and are applied to Quercus nuttallii, but none at present seems to be both very distinctive and in general use. Lumbermen and loggers generally refer to it merely as red oak and do not separate it from others of the red oak group. More specific but less widely used names include smooth-barked or tight-barked red oak, striped oak (in allusion to the acorns), Red River oak (the tree is very common in the Red River Valley in Louisiana), swamp red oak, Mississippi Valley red oak, pin oak, and yellow-butt oak.

This oak is one of the most common trees on the low poorly drained clay (or occasionally loamy) flats and on the fairly well-drained clay ridges throughout the bottomlands of the lower Mississippi Valley. It probably never occurs naturally outside the bottoms. It is not usually found in permanent swamps and is never found in deep swamps. The flats on which it is most

abundant usually have impervious clay soils that are covered with water several inches deep throughout the winter owing to the very slow, poor drainage and the impossibility of surface run-off of fall and winter rains.

The most common associates of the species are red gum, American elm, persimmon, green ash, red maple, overcup oak, water hickory, water oaks (*Q. nigra* and *Q. obtusa*), hackberry, and hawthorn. Ordinarily Quercus nuttallii is not the principal species, from the standpoint of either number of trees or volume, in the mixed stands in which it occurs; but it is of extremely wide distribution, and at least several trees per acre can be found on almost any poorly drained clay flat or low clay ridge within its extensive bottomland range.

The species is usually of medium size only, but in virgin stands it frequently attains a height of 100 to 120 feet with a breast-height diameter of 3 feet or more. The bark of the trunk is very thin, close, hard, and shallowly fissured. Large trunks are usually strongly buttressed. Quercus nuttallii belongs in the red or black oak group and its leaves, bark, and form often bear a striking resemblance to those of pin oak (*Q. palustris*). Usually, however, the leaves are not of such uniform width but are distinctly widest above the middle and taper sharply to a narrow wedge-shaped base. The leaves are duller, also, and usually have blunter lobes and fewer bristle-tips than those of pin oak. The acorns are very distinctive. They average an inch in length and three-fourths inch in width (twice as large as acorns of pin oak) and are produced in rather deep cups that inclose about one-quarter of the nut (in contrast to the shallow saucer-like cups of pin oak). Whereas Quercus nuttallii is extremely common throughout the Louisiana bottomlands, pin oak probably does not occur south of the Louisiana-Arkansas boundary. In east-central Arkansas, where the two species occur together, it is often almost impossible to distinguish between them in the absence of the acorns.

Quercus nuttallii makes up a large part of the total cut of oak from the flats in the first bottoms of the Mississippi Valley Delta region. It is regularly cut for lumber and is one of the few species of commercial value found on the low, wet clay flats. Usually the tree reaches maturity in excellent condition but thereafter degenerates very rapidly. Second-growth specimens usually reach merchantable size (16 to 24 inches diameter at breast height) in from 45 to 70 years and at this age are unusually sound and cut out with a minimum of waste at the mill. Almost the whole volume cut is used for lumber, a small quantity going into cooperage and tie stock. The wood is the reddest and most uniformly textured of the oaks found on low wet sites. It is heavy and hard. Like the wood of many other oaks, it is inclined to check badly.

In future forestry practice in the southern bottomlands Quercus nuttallii should be of considerable importance, owing to its adaptability to sites usually too poor for the production of good-quality timber of other species, its consistently good reproduction, its fair to rapid growth rate, and its high average quality.

Poisoning Scrub Oaks in Western Florida

By E. W. Gemmer, United States Forest Service

One of the most conspicuous features of the landscape on the sandhills of west Florida is the dense stand of scrub oak. Turkey oak (*Quercus catesbaei*), blue-jack oak (*Quercus cinerea*), post oak (*Quercus stellata margaretta*), and live oak (*Quercus virginiana*) occur as an understory in the virgin pine stands and with the removal of the pine become the dominating species. Once they are established it has seemed next to impossible to subdue them or replace them with longleaf pine. A study of the possibilities of poisoning these species was begun on the Choctawhatchee National Forest in September, 1930. Because of the great number of stems—trees 1 foot or more in height number from 5,000 to 25,000 per acre—spraying seemed to be the most practical method of applying the poison. The initial test was restricted to Quercus catesbaei, by far the most common species. Six well-developed sprouts 5 feet in height were selected and each was sprayed with one of the following solutions:

Copper nitrate, 62 grams in 350 grams of water.
Sodium chlorate, 113 grams in 470 grams of water.
Arsenic pentoxide, 37 grams
Sulphuric acid, 37 grams } in 330 grams of water.
Iron sulphate, 75 grams in 330 grams of water.
Sulphuric acid, 37 grams in 330 grams of water.
Copper sulphate, 62 grams in 350 grams of water.

Examination 24 hours after application showed that all sprays had caused injury to the leaves. The two copper compounds and the iron sulphate had turned approximately one-fourth to one-third of the leaves black. The arsenic pentoxide and sulphuric acid had turned all leaves a red-brown. Sulphuric acid alone had turned all leaves brown. Sodium chlorate had turned 90 per cent of the leaves brown. At the end of two weeks conditions were much the same. Trees treated with the copper and iron compounds were healthy, aside from the leaves injured within the first 24 hours. The leaves browned by the sodium chlorate and the sulphuric acid treatment were falling; the stems of the trees treated with these chemicals, however, were alive. Arsenic pentoxide had killed most of the stem, the leaves remaining fast to the branches.

In the spring of 1931 all but two of the trees looked normal. The tree treated with sodium chlorate showed some dead twigs and deformed leaves, but was rapidly recovering. The tree sprayed with arsenic pentoxide was completely dead. One small sprout had started from the stem of this tree and several from the root, but all had died.

On June 25, 1931, additional tests were made with the arsenic pentoxide and sulphuric acid mixture. Cuts

from 3 to 8 inches long, penetrating the wood, were made in the stems by hacking with an ax, and the solution poured on the cuts. The following table indicates the results nine days after the poison was applied:

Species	Proportion of circumference girdled					
	Less than 50 per cent			More than 50 per cent		
	Dead	Injured [1]	Healthy	Dead	Injured [1]	Healthy
Quercus catesbaei	3	7	3	5		
Quercus stellata	4	6		1	1	
Quercus virginiana	2	5		1		
Total	9	18	3	7	1	

[1] Some of the trees classified as injured will unquestionably die.

The problem now appears to be one of developing a practical means of applying the poison. It is doubtful whether more than a few drops of the solution were utilized on the almost vertical cuts, the excess falling to the ground. If the incisions could be made so that greater quantities of the solution would remain in them for a sufficient length of time to be absorbed by the tree, the killing effect would probably be much greater.

Forest Road and Trail Systems

By G. H. Lautz, United States Forest Service

The forest road and trail systems which have been approved as necessary for the national forests during the next 10-year period consist in 82,393 miles of roads and 155,597 miles of trails. The road mileage includes 16,532 miles of forest highways and 65,861 miles of development roads. The former are roads which are of value to the national forests but of primary importance to States, counties, and communities. The latter are roads required for the administration, protection, development, and utilization of the national forests.

The forest highway mileage is represented at present by 6,122 miles of satisfactory roads, 9,048 miles of existing but unsatisfactory highways, and 1,362 miles of proposed construction. It is estimated that to bring the unsatisfactory roads into the desired condition and construct the proposed mileage will require expenditures totaling $189,100,890. This represents an average of $18,165 per mile.

The forest development system consists of 22,724 miles of satisfactory roads, 16,638 miles of existing but unsatisfactory roads, and 26,499 miles of proposed construction. The proposed reconstruction and construction will require $65,056,590, representing an average of $1,508 per mile.

The 155,597 miles of trail in the projected system is represented by 112,427 miles of satisfactory trails, 9,047 miles of existing but unsatisfactory trails, and 34,123 miles of proposed construction. To complete the trail system will require $5,497,990, which represents an average of $127 per mile.

The total amount of funds required to complete the road and trail systems which according to present studies are required within 10 years is $259,655,470. As transportation planning is completed upon one forest after another, the miles of development roads required and the amount of funds deemed necessary are expected to increase. Likewise, increased demand for better highways and oiled roads will probably increase materially the amount required to bring the forest highways up to satisfactory standards.

Polk County, Tex., Surveyed to Determine Prospective Returns from Growing Pines

The latest in a series of county-wide timber surveys by the Southern Forest Experiment Station, designed to bring out information as to the actual returns that may be expected from timber growing, is a study of Polk County, Tex., on which field work was completed in July, 1931. The Texas Forest Service and the Texas Agricultural Experiment Station cooperated in this work. Forestry conditions in Polk County are believed to be typical of those existing throughout a large area in southeastern Texas and southern Louisiana. The county lies chiefly in the shortleaf-loblolly pine type. On much of the longleaf area which it includes, the longleaf type has been replaced by loblolly and shortleaf pine and by scrub oak. Timberland makes up 82 per cent of the county's area, being subdivided as follows: Bottomland, 16 per cent; flatland, 33 per cent; hammock, 9 per cent; ridge, 32 per cent; slope, 9 per cent; swamp, marsh, and water, 1 per cent. Growth is prolific, and except on a few longleaf sites the pines are reseeding satisfactorily.

The survey was facilitated by the availability of a good soil map. Eight strips, 5 miles apart, were run across the county from east to west, and circular sample plots of one-fourth acre each were located at quarter-mile intervals. On the forested plots both pines and hardwoods more than 1 inch in diameter at breast height were tallied by 2-inch diameter classes, as main stand or suppressed trees and according to species. Pines less than 1 inch in diameter were tallied by species and number in each quadrat of a 0.01-acre circle concentric with the larger circle. Species of reproduction were recorded for 0.01-acre plots at 5-chain intervals. Five men covered 200 miles of strip at an average rate of 3.51 miles per man per day.

In addition to the county-wide timber survey, an examination was made of the farm woodlands on 75 farms scattered through the county, plots being taken closer together than in the strip survey. Information was obtained as to income from forest products cut and sold or used on the farms and as to taxes and other

costs of growing timber. Records were obtained also as to forest products removed from the forests of the county, including quantities, values, and production costs. Plots on large holdings will be used to show what such holdings may be expected to produce and as the source of data on growth, stands, cuts, and expenses which will form the basis of estimates as to the financial possibilities of growing pine.

The net area of the national forests was expanded by 696,870 acres in the year ending June 30, 1931, which made it total 160,787,687 acres. Approximately 100,000 acres of this gain is accounted for by an addition to the Boise National Forest, Idaho, and nearly that much is due to the establishing of the Hiawatha, Marquette, and Ottawa National Forests, in Michigan. Lands acquired under the Weeks and Clarke-McNary laws within the year in the Eastern Region and in the Lake States Region totaled 497,444 acres.

Appointments to the Forest Service from the junior forester register of 1931 have reached a total of 32, including 14 for administration and 18 for research.

Visibility Map for Check on Lookout Performance

As a part of the visibility study included in the fire research which the California Forest Experiment Station has under way, a composite visibility map for all points occupied in the Sacramento Canyon unit is being used to check lookout performance. This map shows areas visible to three or more lookouts in blue, areas visible to two lookouts in red, and areas visible to only one lookout in yellow. Blind areas are left uncolored. When a fire is reported the dispatcher locates it on his map and determines which lookouts ought to see it. If the lookouts do not report, they are called and their failure to report is recorded, with the reason.

Forest fuel wood consumed in Oregon and Washington in 1930 amounted to 1,798,076 cords valued at $10,036,969, or $5.58 per cord, according to figures compiled by H. M. Johnson, of the Pacific Northwest Forest Experiment Station. Incorporated cities and towns consumed 546,833 cords. Per capita consumption in Oregon amounted to 0.99 cord.

General Forest News

Present Status of Blister Rust Control in the United States

By S. B. Detwiler, United States Bureau of Plant Industry

The application of blister-rust control to an area of 8,000,000 acres of white-pine lands in the eastern United States has been possible because of the exceptional value of white pine and because the control measures are simple and effective. The success of extensive blister-rust control in the East, together with the progress that has been made in developing similar methods adapted to western forest conditions, gives us grounds for hoping that control of the rust will prove practicable in the West. Generous cooperation on the part of State officials, lumbermen, and public-spirited citizens, and the knowledge that western white pine is the foundation of economic welfare in the Inland Empire, furnish the incentive for the battle on the western front.

The rust is known to be established on pine at 34 centers in Idaho,[1] one in eastern Washington, and several in Oregon. Western Washington may be considered as generally infected. The epidemic is intensifying in Idaho with startling rapidity and the rust must be expected soon to appear in California. To have been entirely effective, initial eradication of Ribes from the best white pine sites should by this time have been completed in Idaho and well begun in California. There is still time to accomplish extensive control in Idaho, eastern Washington, and western Montana, but the work must be done rapidly and well. Preliminary organization of the cooperative control forces has been perfected and the gravity of the situation is realized. Success or failure of control in the Inland Empire depends upon the rate at which Ribes are eradicated from the pine lands in the next five years. There are more than 3,000,000 acres of white-pine lands in this region.

[1] The full extent of pine infection in a region which the rust is just entering, such as Idaho, can not be accurately determined, for the reason that blister-rust cankers do not show up on a pine tree until three years after the tree is infected. Even after three years the cankers are very small and difficult to find. For each new infection center found, therefore, many more remain undiscovered. Thus in a block 15 miles square on the St. Joe National Forest, near Avery, Idaho, one small center of infected pines was found in the fall of 1930, but 18 additional centers were located in July, 1931. These centers had from one to seven infected trees each, as a result of infection occurring in 1927. The existence of fresh infection at so many points in this locality indicated the presence there of a larger and older center of spread. Persistent search finally disclosed such a center in a remote valley on the southern edge of the area. Here the first few pines were infected about 1923 and at the present time more than 50 per cent of the pines on 100 acres are infected, some trees having 50 to 100 cankers. Evidence of this sort indicates that the rust has assumed epidemic character in Idaho.

Control of white pine blister rust differs from control of many other forest-tree pests because it does not require any treatment of the pines such as spraying or dusting or cutting out the diseased trees. It is comparable to the protection of grazing stock by the eradication of poisonous weeds. This disease can not be communicated directly from pine to pine. Before it can attack pine it must develop in a preliminary phase on currant or gooseberry bushes (Ribes). Therefore, even though a pine stand has become infected the thorough removal of Ribes from the stand and from land surrounding it will prevent further infection of the pines.

The cost of initial control work varies directly with the abundance of Ribes plants and to a considerable extent with the character of the cover and with the topography. Maintenance costs will be influenced by these same factors, but the need for repetition of Ribes eradication year after year will depend to a considerable degree on forest-management practices. In the stream type in the Inland Empire region conditions remain favorable for Ribes reproduction from seed, and so far as we now know such areas will need reworking at fairly frequent intervals. After the Ribes have been systematically cleared from the stream type several times, Ribes seed production will probably be so reduced that effective maintenance of control conditions will be possible at low costs. It may be, also, that regrowth of Ribes in this type can be permanently crowded out by encouraging the growth of other plants.

Within the upland forested sites natural control factors exert an important influence. Most of the Ribes plants require sunlight for their best growth and can not survive under strong competition from forest trees. On forest areas freshly denuded by broadcast burning or clear cutting Ribes plants come in thickly and thrive. They mature quickly and produce fruits abundantly before the young forest trees attain sufficient size to inhibit their development. As the forest growth progresses, further establishment of seedling Ribes becomes impossible and the bushes already established weaken and gradually die out. This process is, of course, slow and incomplete and does not generally make Ribes eradication unnecessary; nevertheless it tends to set up an effective barrier against the regrowth of Ribes on forested areas that have been systematically cleared of them. It also offers opportunity to reduce the cost of rust control through a system of forest management that does not destroy the ground cover.

To a great extent the costs of Ribes eradication work in the Inland Empire vary inversely with the age of the forest stand. The average cost per acre in any block or drainage is governed by the ratio of the different types. The cost is greatest in the stream type and is progressively less in reproduction stands, pole stands, and mature stands. Cost of control varies also with the size of the timber tracts to which control is applied, since it is necessary to create a Ribes-free protective zone around the pine. To surround a single acre of pine with a protective zone one-fifth mile in width necessitates clearing Ribes from 122 acres in addition to the acre of timber. If a control area of four townships is protected by a zone one-fifth mile wide the cost of the work in the protection zone is only one-fourteenth of the cost on the protected acreage, or 7 per cent additional. Another reason why large continuous tracts must be chosen for the application of control measures in the West, at least for the present, lies in the fact that western white pine is much more readily attacked by the rust than is northern white pine and the concentration of Ribes in the stream-type probably will cause heavy damage to western white pine stands of all ages within a half-mile radius of such concentrations and possibly to stands farther away.

A highly encouraging feature of the situation as it relates to cost and speed of Ribes eradication in the West is the success attained in destroying concentrations of Ribes by spraying the plants with a solution of sodium chlorate. The outlook is bright for further reduction in control costs by chemical means, as well as by improvements in manual methods of eradicating Ribes.

The public has so long held white-pine wood in high esteem that the fungous and insect enemies of the commercial 5-leaved pine species have come to public attention to a greater extent than is the case with the enemies of most commercial timber trees. Hence one frequently reads that although northern white pine is the preferred species for growing on a certain site a substitute species is recommended because it has fewer enemies. Fifteen years' systematic control effort has demonstrated that the blister rust offers little handicap to the production of northern white pine on 95 per cent of its sites. The cost of blister-rust control in the East should not exceed $1 per 1,000 feet of lumber produced and in most cases should be only 5 to 10 cents per 1,000 feet, especially if attention is given to keeping the area fully productive by ample stocking. If a production program is mapped out wherein the sites are chosen for suitability to this purpose I believe there will be no difficulty in producing northern white pine in adequate quantity and with profit. Obviously it will pay to apply simple measures for improving the stands as well as to protect them. Under a systematic program of northern white pine culture we can assume that the most favorable sites are occupied by this species, with low control costs. If it pays to grow any timber species it will pay to grow northern white pine under these circumstances.

Birds have effectively controlled two outbreaks of the southern pine beetle on the Pisgah National Forest, N. C., according to observations of R. A. St. George, of the Bureau of Entomology. The beetles entered the trees in August, 1930, but were brought well under control through the work of the birds by September of that year. By the first of April, 1931, the birds had cleaned out 90 or 95 per cent of the brood.

Successful Reproduction of Longleaf Pine on Norfolk Soils

By H. H. Chapman, Yale School of Forestry

One of the most striking examples of natural regeneration of longleaf pine in the South is found on an area of about 20,000 acres owned by the Alger-Sullivan Lumber Co. in townships 1, 2, and 3 north, ranges 7 and 8 east, in Escambia County, Ala., lying east of Escambia Creek and west of the Selma division of the Louisville & Nashville Railroad. These lands were purchased by the company in the year 1900. They had been team logged during the years 1898 to 1900, the timber being cut to about 15 inches at the stump. At the time of this cutting no attention was given to the disposal of slash or to provision for future timber production.

About 12 years ago, under the guidance of Austin Cary, the company began thinnings on portions of the tract where the trees were from 10 to 15 years old. The thinnings were in progress through a period of three years, being so handled that no excessive quantity of slash accumulated on the ground and the trees finally left standing were carefully spaced. About eight years ago the company plowed firebreaks along the roads and did some work in the way of making firebreaks on the timbered area and preventing and stopping woods fires. During the past three or four years they have given more attention to fire prevention, and while they have not succeeded in eliminating fires they have made some progress in this respect. During the past 10 or 15 years the company has carried out salvage cuttings of lightning-struck and bug-killed trees. The trees have been cut so as to fall into open places, where possible, and the tops left unlopped. Elsewhere the slash from the tops has been lopped and piled.

This tract is almost completely restocked with longleaf pine varying in age from seedlings to timber 50 and 60 years old. Parts of the area show almost perfect examples of reproduction under group selection methods, several distinct age classes being present on comparatively small areas. Most of the reproduction is more than 8 years old, which means that it became established during the period when fires burned frequently—in most cases, annually. There were few hogs; and the soil types, Norfolk and Orangeburg, favor deep early rooting and strong growth of the seedling, which result in the initiation of height growth as early as the third year. To these facts is due the success of natural reproduction.

A tract of some 60,000 acres in Baldwin County, Ala., owned by the Tennessee Coal & Iron Co., is of similar character. This tract has been held about 12 years. In purchasing it the company excluded any lands that had not already become heavily stocked with second-growth longleaf pine of sapling and pole sizes. Such stands were found to coincide so closely with the Norfolk series of soils that a soil map was the main dependence in selecting the areas to purchase. Fire protection, beginning from 8 to 10 years ago, has shown striking results in improved growth and density of stands; but the entire area had already restocked, owing to favorable soil and rapid start of the seedlings, before annual fires were stopped.

Preservative Treatment of Wood Shows Slight Decline in 1930

The quantity of wood treated with preservatives in the United States in 1930 was 8 per cent less than the quantity so treated in 1929, according to figures compiled by R. K. Helphenstine, of the United States Forest Service, on the basis of information furnished to the American Wood Preservers' Association by all the treating plants in operation during the year. The total quantity of wood so treated during the year, by either the pressure-cylinder or the open-tank method, was 332,318,577 cubic feet. Pressure processes were used in treating 90 per cent of this quantity.

In 1930 a total of 204 plants were in active operation, or one more than in 1929. These included 134 plants of the pressure-cylinder type, 53 open-tank plants, and 17 plants equipped for both pressure and non-pressure treatment.

Decreases from quantities reported in 1929 were shown by all but one of the eight classes of material treated in 1930, the exception being switch ties. Crossties showed the greatest decrease, 23,267,988 cubic feet. Other large decreases were as follows: Poles, 1,896,171 cubic feet; wood blocks, 1,839,685 cubic feet; and construction timbers, 1,190,442 cubic feet.

The treating plants used 5.5 per cent less creosote and 5.2 per cent less petroleum in 1930 than in 1929. Their consumption of zinc chloride registered a decrease of nearly 30 per cent, although in the treatment of every class of material other than crossties and switch ties this salt was used in greater quantities than before.

The quantities of materials of different classes treated by the plants and of preservatives used by them during the years 1929 and 1930 were as follows:

		1929	1930
Preservatives used:			
Creosote—			
Domestic [1]	gallons	134,063,664	145,595,733
Imported	do	92,310,563	68,308,688
Total	do	226,374,227	213,904,421
Petroleum	do	29,656,181	28,100,316
Zinc chloride	pounds	19,848,813	13,921,894
Miscellaneous:			
Salts	do	1,188,148	1,770,925
Liquids	gallons	38,410	202,891
Material treated:			
Crossties—			
Hewed	number	39,538,193	30,009,883
Sawed	do	31,484,910	33,257,224
Total	do	71,023,103	63,267,107
Switch ties	board feet	173,107,698	175,472,552
Piles	linear feet	25,324,255	25,176,923
Poles	number	4,383,768	4,276,031
Wood blocks	square yards	2,610,335	1,909,503
Construction timbers	board feet	242,145,744	228,160,433
Cross arms	number	3,158,165	2,096,234
Miscellaneous	board feet	134,635,355	123,410,202

[1] Includes distillate coal-tar creosote, creosote coal-tar solution, refined water-gas tar, and water-gas tar solution.

Living Fence Posts of Black Locust

Young black locust trees become fence posts without being cut and with a minimum of injury from the nails that hold the fence wire, when grown and treated according to the method advocated by Neal Kitchens, of Warm Springs, Ga. Doctor Kitchens has been experimenting with black locusts for five years. He describes his method as follows:

Set out the plants in rows 3 feet apart each way. When they are 5 feet tall or taller, transplant them to the place where they are to be used as posts. Cut the roots not more than a foot long. From each piece of root left in the ground a new tree will shoot up. A plot of ground 30 feet by 40 feet will produce from 150 to 250 trees 5 feet tall or taller every second year. When transplanting the trees cut them back to 5 feet, the height of the fence. The 2-year-old trees grow better than any other age. The growth depends on the soil. Here on Jonah Farm we have some growths of 30 feet or more in two years. The remaining time required to grow the trees big enough for posts is from two to five years.

In tying the barbed wire to the tree, if you break the bark the tree will soon cover the wire, a condition undesirable for several reasons. The best solution of this problem we have found is to use a piece of galvanized roofing 2 inches by 4 inches with two holes an inch apart in the short dimension. Use number 8 round nails instead of staples. Drive the first nail under the wire through the lower hole. When it lacks an inch of being driven the whole way in, bend it up. Then drive a nail in the upper hole and when an inch remains bend it over the head of the first nail. Then if you ever want to remove the wire you can do so without injury to the tree.

"Philippine Mahogany" Approved as Trade Name

In a recent decision the Federal Trade Commission has ruled that the term "mahogany" as applied to Philippine hardwoods that resemble true mahogany does not deceive or injure the public nor constitute an unfair method of competition in interstate commerce. Previously, in 1926, the commission issued a cease-and-desist order against six importers of Philippine lumber preventing them from describing the wood as mahogany, and an appeal from this decision to the courts was lost.

Another recent ruling of the commission is to the effect that western yellow pine (*Pinus ponderosa*) lumber must not be offered for sale as "white pine."

Forestry Film Strips Available

The Office of Cooperative Extension Work, United States Department of Agriculture, having entered into a new contract with the firm that for several years has been manufacturing its film strips, is calling attention to the availability of these strips at prices ranging from 35 to 71 cents each. The 120 series of film strips which the office has available include a number dealing with farm forestry and related subjects. Lecture notes are provided with each strip. A list of the film strips, and instructions as to how they may be purchased, may be obtained by writing to the Office of Cooperative Extension Work, United States Department of Agriculture, Washington, D. C.

Needle-Miner Injury to Spruce in New England

By C. W. Collins and T. H. Jones, United States Bureau of Entomology

Leaf-miner injury to spruce in New England was reported in 1930 to the gipsy moth laboratory of the United States Bureau of Entomology, at Melrose Highlands, Mass., and during the past year some attention has been given to this problem by workers in the laboratory. Field studies have been made with the idea of ascertaining how much damage is being done and how to prevent it. After the collection of material in the field, investigations have been carried on at the laboratory to learn to what species of small moths these leaf miners belong, and to obtain information on their life histories, their habits, and their parasites.

The most severe infestations noted in 1930 covered small areas only, sometimes less than an acre each. They seemed to be confined to a district near the seacoast of Maine, between Orrs Island and Pemaquid in Sagadahoc and Lincoln Counties, and did not appear to be of long standing. Both red spruce and white spruce had been attacked. As yet no evidence has been found of trees being killed by the leaf miners nor have any completely defoliated trees been noted, though the percentage of leaves mined is often high. The unsightliness of heavily infested trees is a matter of concern to some owners and caretakers of summer residences in the heavily infested district, who consequently are interested in control measures.

Studies so far made indicate that Epinotia nanana Treitschke is the predominant species, although some of the injury is caused by Recurvaria piceaella Kearfott and possibly by others. The two species mentioned have somewhat similar habits. The eggs are laid in the summer and the larvæ that issue from them hollow out the needles. The larvæ become torpid when cold weather comes and remain in this condition until the following spring, when they resume feeding. Injury by both species was reported in this country many years ago. Epinotia nanana Treitschke was first described from Germany.

It is too early to give any definite directions as to control measures, but the experiments so far conducted indicate that timely, thorough spraying with lead arsenate during the first part of July is effective. From 4 to 5 pounds of powdered lead arsenate should be used to 100 gallons of water, with 4 ounces of fish oil added for each pound of the poison as an adhesive.

Brown Co. Offers Hardwood Seed of Certified Origin

In sales of New England hardwood seed the Brown Co., Berlin, N. H., is prepared to provide with each shipment made this fall a record showing where the seed were collected and the approximate elevation and mean summer temperature of the place of origin. Species of which seed are offered by the company include white ash (*Fraxinus americana*), paper birch (*Betula papyrifera*), yellow birch (*Betula lutea*), American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and red oak (*Quercus borealis maxima*).

Softwood species of which this company supplies after-ripened seed certified as to origin are balsam fir (*Abies balsamea*), white spruce (*Picea glauca*), Norway spruce (*Picea excelsa*), black spruce (*Picea mariana*), red spruce (*Picea rubra*), Norway pine (*Pinus resinosa*), northern white pine (*Pinus strobus*), Scotchpine (*Pinus sylvestris*, var. *rigensis*), northern white cedar (*Thuja occidentalis*), and eastern hemlock (*Tsuga canadensis*).

Another service offered by this firm is laboratory testing of tree seed as to purity and germination, at a fixed charge per sample.

Foreign Notes

Local Commissions Supervise Management of Private Forests in Finland

Under a Finnish ordinance of 1917 it became illegal to cut timber without provision for protecting natural regeneration, or to cut a growing young conifer forest otherwise than in thinning it. Violation was made punishable by prohibition of cutting on the forest involved and by the requirement that forest regeneration be brought about by artificial means. To enforce the ordinance provincial forestry commissions and inspectorships were created and also communal forestry commissions. Before timber on private land was cut for sale it was required that the date and place of the projected cutting, and the quantity of wood which it was intended to cut, be reported to the communal commission, unless the cutting was to be made according to a duly approved plan or as a thinning. In 1928 the cuttings coming under this requirement numbered 29,019, involving 10,300,000 cubic meters of wood and a total area of 1,179,000 hectares.

By the end of 1928 there had been 1,215 proved violations of this ordinance, involving a total area of 10,270 hectares. In consequence of these infractions cutting was banned on 953 forests with a total area of 83,142 hectares. Reforestation work carried out on cut-over areas under the surveillance of the provincial forestry commissions included seeding 1,559 hectares, planting 8.6 hectares, and clearing for reforestation 1,674 hectares. The expense of this reforestation work amounted to 688,610 Finnish marks.

A new law applying to private forests became effective January 1, 1929, repealing the law of 1917. Under the new law 18 forestry commissions are designated, the duties of which combine measures opposed to deforestation with encouragement of correct forest management practice through educational activities including supervision of forestry operations on private lands.

Recent Japanese legislation provides for the establishment of a system of five or six national parks.

Silviculture in the Netherlands

(From a paper by E. D. Van Dissel, Director of the Forestry Administration of the Netherlands)

Between 1833 and 1930 Holland's forested area increased from 169,000 hectares to 254,138 hectares, and its total area of uncultivated land diminished from 889,000 hectares to 378,225 hectares. (In 1930, forested lands composed 7.76 per cent of the country's total area, and uncultivated lands composed 11.55 per cent of the total.) Afforestation has been effected principally with conifers. In 1833 the coniferous forests of the Netherlands were less than one-fourth as extensive as its broadleafed forests; in 1930 they occupied 152,647 hectares as compared with 101,491 hectares occupied by broadleafed species. Factors in this trend were the growing demand for mine timbers, which resulted in an advance in the price of softwoods, the relative simplicity and inexpensiveness of the propagation of conifers, and the low site requirements of Scotch pine. The agricultural crisis of 1870–1880, also, put an end to agricultural use of much sandy land. Later the more and more widespread use of chemical fertilizer turned the balance in the other direction, and in the present century private owners have shown a lessening interest in forestation. It is due principally to State and communal intervention that the area of forests in Holland is not now diminishing.

On January 1, 1929, the division of the forested area among the different ownership classes was as follows: The State, 6 per cent; communes, 8.5 per cent; organizations, 1.4 per cent; and private owners, 84.1 per cent.

Much of Holland's State-owned forest land was sold in the first half of the nineteenth century. In the second half of the century such sales diminished; the widespread cutting of young privately owned softwood forests for export of mine timbers had brought home to the Government and also to the people the fact that a permanent forestry property is a matter of general interest.

In 1888 a group of landowners, following the Danish example, founded the Nederlandsche Heidemaat-

schappij (Society for the Clearing of Heathlands), an institution that has done much to transform uncultivated lands into meadows and fields and to bring about silvicultural progress. From the first, the State entrusted to the society the forestation of certain dune areas.

A law of 1899 created a State forestry administration, the task of which was confined at first to the conservation of certain forests and the forestation of uncultivated soils. A decree of 1907 extended the administration's functions so as to make technical and financial aid available to communes in afforesting uncultivated lands. This aid was later made available to other landowning bodies. The financial aid takes the form of a free advance to be repaid in 50 years. At present a maximum of 80 per cent of the expense of forestation is allowed, to the amount of 200 florins per hectare. On January 1, 1930, 48 communes and 1 association were profiting by this form of State aid. At that time a total surface of 14,280 hectares had been dedicated to reforestation with State aid, and of this total 9,481 hectares had already been forested. Lands thus afforested are permanently subject to State supervision.

The State forests in 1930 had a total area of 40,716 hectares. In the 10-year period 1920–1929 the State forestry administration, the communes, and private owners afforested about 17,700 hectares of uncultivated land.

The Netherlands climate is rather clement, and is characterized by high humidity, cloudiness, and strong winds. The mean annual temperature is 10° C. Annual rainfall averages 707 millimeters. Silviculture in Holland is practiced almost exclusively on sandy soils, the fertile soils being largely monopolized by agriculture and truck farming.

A. J. van Schermbeek, forest administrator and from 1900 to 1915 professor in the Wageningen School of Agriculture, Horticulture, and Silviculture, is credited with popularizing silvicultural principles in Holland, bringing into disfavor the practice of growing Scotch pine in pure stands. For planting as an understory to Scotch pine he advocated the use of Quercus rubra, Fagus sylvatica, Carpinus betula, and Castanea sativa. Conifers which he used in mixture with it were Pseudotsuga taxifolia, Larix leptolepis, and Abies alba.

To assist initial growth, it is a common practice to treat the soil with compost. To improve soil worn out by long culture of pines or by repeated removal of litter, after a clear cutting lupines are sometimes cultivated and chemical fertilizers used.

The work of afforesting heathlands is usually begun by plowing the soil. Often, also, a disk harrow is used. This and the digging of whatever drains and ditches are needed constitute the only preparation required for planting Scotch pine. One-year-old seedlings or, rarely, 2-year transplants, are used, or seed are sown.

Along the roads, which are 8 to 10 meters wide, rows of birch, red oak, black cherry, black locust, etc., are planted as a protection against fire.

Heathlands of better quality are often forested with Quercus robur, Fagus silvatica, Larix europæa, Larix leptolepis, Pseudotsuga taxifolia, etc. In preparing the soil for these species it is usual to cultivate lupines (*Lupinus luteus*) for a year or to use chemical fertilizers. Frequently, after the lupines are turned under, 1 or 2 year old plants of Alnus incana are set out at the rate of 4,000 or 6,000 per hectare and the principal species are planted between them. As a rule a mixture of principal species is planted. Ordinarily another crop of lupines (*Lupinus angustifolia*) is planted at the same time with the trees. Sometimes birch is used as the nurse species.

In preparing to afforest surfaces covered with shifting sands, the edges of the sand hills are rounded off, and if vegetation is present holes are dug for the trees. Basins formed by æolian erosion are worked either with the plow or with the spade to a depth of 30 or 35 centimeters. So much of the land as is not vegetated is then covered with cut brush, weighted at intervals with shovelfuls of sand. Scotch pine is planted on these areas, and in a smaller proportion Austrian pine and Corsican pine. As the pines become older an effort is made to introduce broadleafed species.

In efforts to reforest the dunes, a special difficulty is the constant sea wind. The presence of many kinds of herbs has seriously impeded the initial growth of trees on the dunes. Preparatory work consists in making holes for the trees or digging trenches for them, or spading the whole surface. To fix the soil, it is usual to plant sedges and to place cut brush on the places most exposed to the sea wind. The species preferred for afforesting the dunes is Austrian pine. Corsican pine, also, prospers on well protected sites, and in some places maritime pine is found serviceable. On spots retentive of moisture such hardwoods as oak, beech, and poplar are planted. For borders to serve as windbreaks, alders, hawthorne, poplar, birch, and willow are used.

On Terschelling, an island in the North Sea, good results in dune afforestation have been obtained for some years by inserting in each planting hole a turf saturated with water, against which the tree is placed.

The oldest of the dune forests are now furnishing wood products. Sheltering and protecting the shore, they also represent a considerable "touristic" value.

The Wageningen school of agriculture offers a 5-year scientific course in silviculture. Practical instruction in the rudiments of silviculture and agriculture is given by the Nederlandsche Heidemaatschappij, separate courses being provided for students who have had secondary-school training and students without such

training. Since 1919 the State has maintained a silvicultural experiment station at Wageningen.

In 1926 there was founded in Holland an organization to guarantee Scotch pine seed as to source. The members engaged not to produce or place on sale foreign-grown plants or seeds. The harvesting of seed and propagation of plants by the members of this society are subject to Government control.

During the war, a provisional forestry law was adopted empowering the Minister of Agriculture to forbid the cutting of forests or to place conditions upon it. This was replaced in 1922 by a forestry law that makes provision against natural enemies of forests and against fire risk involved in the operation of railroads and provision for the maintenance of natural beauty. This law requires that notice be given to the director of the forestry administration before timber is cut on communal and other lands. The law provides also for subventions to communes and other public bodies in cases involving the maintenance of natural beauty formed by forests. In 1931 such subventions amounted to 80,000 florins.

A law of 1926 exempts from taxation the revenues from forest exploitation other than that of coppice. Under a law of 1928 the Government lays restrictions on cuttings in forests having a special degree of natural beauty, these restrictions being balanced by tax relief.

Areas having special interest from the point of view of botany, ornithology, geology, or history, or because of natural beauty, are set aside by the Government as natural monuments. The most notable of the areas protected in this way are located on the islands of Texel, Vlieland, and Terschelling, in the North Sea.

Willow Culture in the West of England

Willow culture provides employment for about 5,000 men, women, and children in Somersetshire, England, approximately that number being engaged in growing and marketing the shoots and in making wicker articles, reports Consul Roy W. Baker, Bristol. The area under willow culture in Somersetshire exceeds 3,000 acres. Since 1926 the national research station at Long Ashton, near Bristol, has been experimenting with methods of spraying the willows in order to protect them from the beetles which in extreme cases render the willow product of an entire district unmarketable. The machines which the station has devised for this purpose include horse-drawn devices for wet spraying and engine-driven machines for powder dusting, as well as a variety of hand apparatus.

Under a 1930 amendment to the land tax act of Nova Scotia, any private owner of as much as 1,000 acres of timberland must obtain a Government license before felling any timber of potential pulpwood value. The act says "A cutting license may be for such period and in respect of such trees and subject to such terms and conditions as the minister deems proper."

Eleventh Year's Work of the British Forestry Commission

In the year ending September 30, 1930, the British Forestry Commission, entering upon its second decade of activity, acquired a net total of 85,230 acres of land, of which 34,360 acres was plantable, and planted or sowed 24,721 acres. Conifers and hardwoods were planted in the proportion of about 11 to 1. The stock used in forming plantations and "beating up" previous years' plantations was 44 per cent Scotch and Corsican pine, 26 per cent Norway and Sitka spruce, 13 per cent European and Japanese larches, and 5 per cent Douglas fir. The lands planted during the year included 1,174 acres of former Crown woodlands and 2,048 acres replanted after damage by fire. An area of 269 acres of existing woods was underplanted.

During the year 159 additional forest workers' holdings were completed, bringing the total to 777.

Total expenditures of the commission for forestry operations in the fiscal year 1930 were £675,631. Expenditures in acquiring land, with buildings and standing timber thereon, amounted to £164,760, and expense in respect of land held on land lease or feu amounted to £21,880. Cultural operations cost £280,356, of which £206,787 was spent on plantations and £73,569 on nurseries. Expenditures on forest workers' holdings totaled £108,575, and income from the holdings was £12,206. Grants to private individuals and local authorities for planting forest trees and clearing scrub growth during the year totaled £12,111.

In May, 1930, the guaranteed minimum weekly wage of adult male workers in regular or seasonal employment was raised to 35s.

The maximum number of persons (exclusive of divisional and district officers and office staffs) employed in the commission's forests at any time during the year was 3,850. Forest workers resident on holdings numbered 953.

The commission's nurseries on September 30, 1930, had a total extent of 863 acres and were stocked with 254,000,000 seedlings and 100,000,000 transplants.

Nursery investigations during the year dealt in the main with growing seedlings for use on cultivated sites, the technique of growing birch and alder, and the improvement of germination of European larch and Sitka spruce through special methods of covering the seed to prevent caking. Satisfactory progress was reported in all three projects. Plantation experiments were continued on peat soils and on poor calluna heaths. Plots of different nurse species were established on shallow soils over chalk at Buriton Forest, in Hampshire, experience having shown that beech and larch planted direct on such soils often suffer severely from frost and drought. Additional experimental plots were established with plants grown from different lots of Scotch pine, lodgepole pine, and oak.

The total net land area acquired by the commission in its first 11 years of activity was 540,633 acres, of

which 344,590 acres was plantable. Of the total plantable area 59 per cent was situated in England and Wales and 41 per cent in Scotland. Within the 11 years 153,072 acres of the land was planted, 145,818 acres with conifers and 7,254 acres with hardwoods. Replacements were required by 7,598 acres of conifers and 2,330 acres of hardwoods.

The Mexican Government has undertaken to eradicate Spanish moss from the forest of Chapultepec, where the moss is present in great abundance particularly on cypress. Deformation and even death of vigorous cypress and other trees in Mexican forests is said to have resulted in many instances from the fact that the moss completely covered the foliage of the trees and thus interfered with the trees' assimilative functions. The moss is found objectionable also as harboring injurious insects.

Forest planting which the Forests Commission of Victoria, Australia, planned to carry out this season would extend the State's softwood plantations by 5,000 acres, making them total 27,500 acres. A June 10 report of American Trade Commissioner S. R. Peabody stated that 500 men were engaged at that time in the State's planting and forestry work and that the forestry commission hoped to receive unemployment-relief funds enabling it to double this number. Douglas fir, western yellow pine, and Corsican pine were the principal species being planted with the aid of unemployment-relief funds.

Personals

William T. Cox, who returned some months ago from Brazil, has been appointed chairman of the Minnesota Conservation Commission. Before going to Brazil in 1929 to head a Federal forest service Mr. Cox was director of the Upper Mississippi River Wild Life and Fish Refuge of the United States Bureau of Biological Survey. Previously he served for 11 years as State forester of Minnesota.

Willis M. Baker has left the directorship of the Pennsylvania Forest Research Institute to accept that of the Central States Forest Experiment Station, succeeding E. F. McCarthy, now professor of silviculture in the New York State College of Forestry. Mr. Baker received the B. S. degree in forestry from the Pennsylvania State College in 1914. After three years' experience with the United States Forest Service he joined the State forestry organization of New Jersey. From 1922 till 1930 he was associate State forester of New Jersey, engaging largely in research.

William Crocker, director of the Boyce Thompson Institute for Plant Research, Yonkers, N. Y., has been made acting director and general manager of the Tropical Plant Research Foundation. The foundation's offices have been moved temporarily to Yonkers, where its address is 1086 North Broadway.

David T. Mason, consulting forester of Portland, Oreg., has been appointed manager of the new Western Pine Association.

Joseph S. Illick, formerly State forester of Pennsylvania, has been appointed head of the department of forest management of the New York State College of Forestry, at Syracuse University, with which he was connected for a portion of the past school year as special lecturer in silviculture.

Edwin A. Ziegler, after two years' service as forest economist of the Southern Forest Experiment Station, has returned to Pennsylvania as head of the Pennsylvania Forest Research Institute, at Mont Alto. Doctor Ziegler was connected with the Pennsylvania State Forest School at Mont Alto, as teacher and director, from 1909 to 1929.

J. E. Lodewick has joined the staff of the Pacific Northwest Forest Experiment Station as silviculturist in charge of the section of forest products. Doctor Lodewick received the degrees of B.S., M.S., and Ph.D. from the New York State College of Forestry, and has taught wood technology and allied subjects there and elsewhere. Recently he has been connected with the Virginia Polytechnic Institute.

J. W. K. Holliday has been appointed State forester of West Virginia, succeeding Harold S. Newins. Mr. Holliday is a graduate of the Pennsylvania State Forest School and has had experience as a district forester in West Virginia. He is a native of West Virginia, his home being at Parkersburg.

Thornton T. Munger, director of the Pacific Northwest Forest Experiment Station, has been designated as official representative of the United States Forest Service at the Fifth Pacific Science Congress, to be held in Victoria and Vancouver, British Columbia, May 23–June 4, 1932.

C. C. Delavan, professor of forest extension, and Henry R. Francis, professor of forest recreation, of the New York State College of Forestry, have been granted sabbatic leave for the school year 1931–32. Professor Delavan will take up graduate work at the University of Michigan, and Professor Francis will work for an advanced degree at the University of Washington.

The forestry department of the Michigan State College, East Lansing, Mich., of which the late A. K. Chittenden was head from 1915 to 1930, as reorganized this summer has the following staff: Professor of forestry and head of the department, P. A. Herbert (Cornell, '21), formerly senior forest economist with the United States Forest Service; associate professor in charge of the utilization series, Harold S. Newins (Yale, '11), formerly associated with the Oregon Agricultural College, the Cutler Dry Kiln Co., and the Pennsylvania State College, and more recently State forester of West Virginia; assistant professor in charge of silvics and silviculture, R. H. Westveld (Yale, '25), on the staff since 1928 and formerly with the Pacific Northwest Forest Experiment Station; assistant professor in charge of dendrology and municipal forestry, Karl Dressel (Michigan State College, '22), on the staff since 1926; in charge of mensuration and protection, A. B. Bowman (Pennsylvania State College, '22), formerly with the United States Forest Service in Montana and Idaho; in charge of the Dunbar Forest Experiment Station and Nursery at Sault Ste. Marie (since 1927), Putnam Robbins (Michigan State College, '27); extension forester (since 1924), Raymond Kroodsma (Yale, '16), formerly forester for the United States Military Academy. One position remains to be filled during this school year, that of assistant silviculturist to take charge of the college nursery, which has an annual output of more than 1,000,000 trees, engage in nursery research, and conduct the course in seeding and planting. The department is entering the new year with more complete equipment, better library facilities, and a larger operating budget.

L. O. Howard retired from the Government service on June 30, 1931, after 52 years' service in the Bureau of Entomology. Doctor Howard was appointed in 1878, a year after his graduation from Cornell University, as one of the first three entomologists in the Department of Agriculture. He became chief of the Bureau of Entomology in 1894. Since leaving that position in 1927 he has added two books on economic entomology to his very long list of publications. In the month of his retirement he received the 1931 Capper award of gold medal and $5,000 for distinguished service to American agriculture. This award was based on outstanding services in perfecting insect-control measures, particularly the biological method of control, and work on the carrying of disease by insects. Doctor Howard's plans for the immediate future include a trip around the world and studies in Paris.

Jay Higgins, supervisor of the Black Hills National Forest, S. Dak., has been transferred to the regional headquarters of the United States Forest Service at Denver for research work including erosion studies. He is succeeded by Galen W. Pike, who has had charge of the Rochford ranger district on the Black Hills Forest.

Robert W. Williams, deputy game conservation officer of the Bureau of Biological Survey, with headquarters in Tallahassee, has been appointed assistant United States game conservation officer, succeeding Talbott Denmead. Mr. Williams was solicitor of the Department of Agriculture from 1920 to 1929.

William C. Adams, head of the Massachusetts division of fisheries and game, has been appointed chief of the New York division of fish and game.

Burt P. Kirkland, who left the faculty of the University of Washington this year to join the forest survey staff of the United States Forest Service, is now stationed at Washington, D. C.

George W. Peavy, dean of the School of Forestry of the Oregon State College, has succeeded Burt P. Kirkland as a member of the editorial staff of the Journal of Forestry. His editorial field is that of forest protection and administration.

Allen H. Hodgson, who since 1926 has been a member of the forest products research staff of the United States Forest Service in the North Pacific Region, has assumed the duties of personnel training officer for that region.

L. C. Hurtt, supervisor of the Helena National Forest, Mont., has accepted a transfer to the Northern Rocky Mountain Forest and Range Experiment Station, where he will have charge of range management research.

A. G. Simson, since 1923 a member of the Pacific Northwest Forest Experiment Station engaged largely in studies of static and lightning phases of fire weather, has been transferred to the regional office of the United States Forest Service at Portland, Oreg., to carry on a study of portable radio equipment and communication. D. L. Beatty, formerly in charge of this work, has resigned.

G. H. Wiggin, in charge of the State forest nursery of North Dakota, has accepted appointment as forester for the University of Kentucky.

L. G. Hornby, who has charge of a Forest Service study of transportation problems with reference to fire control in the Northern Region, has been transferred from the regional office to the Northern Rocky Mountain Forest and Range Experiment Station. W. W. White and H. R. Richards will continue work on this study as members of the regional office, under the general direction of the experiment station.

Ralph M. Nelson, pathologist in the Bureau of Plant Industry, has accepted a transfer to the Forest Service, and is taking charge of fire-damage studies of the Appalachian Forest Experiment Station. Charles R. Hursh, formerly assigned to this work, is taking charge of erosion and streamflow investigations.

A. D. Folweiler, who was formerly a district forester in North Carolina and who received the M. F. degree from Yale University this year, has accepted appointment as assistant State forester of Florida.

W. D. Humiston, assistant general manager of the Potlatch Lumber Co., has resigned as secretary of the Northern Idaho Forestry Association. His successor is A. A. Segersten, of Potlatch.

N. T. Barron is being promoted from the position of district forester at Spartanburg, S. C., to that of assistant State forester of South Carolina. He will have charge of applied forestry, nursery work, and public-relations matters. W. C. Hammerle, district forester at Wilmington, N. C., will succeed Mr. Barron.

John M. Briscoe, professor of forestry in the University of Maine, is the new president of the Yale Forest School Alumni Association. The new vice president is Raymond E. Rendall, forester of Bates College, Maine.

Paul M. Dunn, who has held the position of district forester, Missouri State Department of Forestry, has gone to the Utah State College of Agriculture, Logan, Utah, where he succeeds Charles M. Genaux as forestry teacher and extension forester.

P. B. Rowe, junior forester on the Fishlake National Forest, Utah, has been transferred to the California Forest Experiment Station for work on erosion and streamflow studies.

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Decay in Pacific Northwest Conifers

By Ernest Wright, United States Bureau of Plant Industry

Anyone desiring a more intimate knowledge of forest pathology should by all means read Decay in Pacific Northwest Conifers, by J. S. Boyce, which has been published by Yale University as Osborn Botanical Laboratory Bulletin No. 1. This bulletin is written in such a simple, clear style that it immediately becomes of special value to nontechnical men.

In an opening section devoted to a general discussion of decay Doctor Boyce points out that for many years to come decay will continue to be an important factor in the management of coniferous stands in the Pacific Northwest, even though the peak of lumber production in the region is now in sight. In fact, it will increase in importance, since less accessible and less desirable stands in which the quantity of defect is relatively higher are now being reached and must form an increasing proportion of the cut for some years.

Decay is caused by wood-destroying fungi, and is of two general classes. The first is termed delignifying decay because it removes more lignin than cellulose from the wood. In the early stages of delignifying decay the wood is not greatly weakened and can still be used for some purposes. Trametes pini is a typical delignifier. The second is known as the carbonizing type and destroys more cellulose than lignin. Even the early stages of this second type of decay render the wood useless where strength is required. Ultimately the wood is reduced to a carbonaceous mass easily pulverized between the fingers. Polyporus schweinitzii typifies the carbonizing decays.

When decay has been in progress for some time, fruit bodies or conks develop on the exterior of the tree. At maturity these produce myriads of tiny spores which are easily disseminated by the wind. Spores alighting in a suitable place germinate by sending out tiny hyphae which institute decay. The hyphae of nearly all the wood-destroying fungi that attack living trees are unable to penetrate bark or living sapwood. Entrance to the heartwood is offered them by dead wood in branch stubs, broken tops, and fire scars or other wounds.

For cruising and scaling timber a knowledge of the indications of decay is absolutely essential. On this subject there exists an enormous quantity of misinformation. An experienced woodsman can soon learn the indications of decay and learn how to apply this knowledge. Sections devoted to the indications of decay form one of the most important parts of the bulletin.

Discussing rate of decay in the individual tree and in the stand as a whole, Doctor Boyce states that there is a general tendency to overestimate greatly the rapidity with which decay progresses. Detailed examples are given which help materially in explaining the difficulties encountered in estimating rate of decay.

The decay fungi attacking down timber do not work principally in the heartwood but attack the sapwood first and in some cases confine their activity to it. The fungi causing most of the decay of down timber in the Pacific Northwest Region rarely attack living trees.

A discussion of stains and discolorations brings out the fact that considerable confusion exists as to what is stain and what the early stages of decay.

Proceeding to the subject of decay as it occurs in specific host trees, the author takes up, more or less in order of importance, the various rots affecting Douglas fir; Sitka and Engelmann spruce; balsam fir; western and mountain hemlock; western white, western yellow, lodgepole, and sugar pine; incense, western red, Port Orford, and Alaska cedar; western larch; and western juniper. To each type of rot is assigned a common name that is descriptive and characteristic of the decay. The individual rots are described and their common means of entrance given. Indications

of decay in the standing tree are dealt with in detail, which will greatly assist the woodsman. The list of decay fungi with their hosts shows that certain rots, such as the pocket dry rot of incense cedar, are confined to a single tree species but that others are much less closely restricted. An example of the latter type is the red ring rot, which takes first rank in importance and is the most common decay of conifers throughout the North Temperate Zone.

The closing paragraphs of the bulletin are devoted to measures for the control of decay in the forest. At present control is economically limited to what can be accomplished by indirect measures when the stand is cut and through the prevention of wounds. Man is often directly responsible for wounding trees during logging or during road and railroad construction, in blazing, and especially through the use of fire. Fire scars furnish perhaps the most common avenue of entrance for decay. From the examination of many stands in the Pacific Northwest it appears that after a certain period in the life of the stand the yearly or periodic growth increment is less than the yearly or periodic decay. This is particularly true of white fir and Douglas fir. A study of the latter species showed that there was an actual net loss from decay beginning as early as 215 years in the most defective stands. It is difficult to determine actual financial loss due to decay in standing timber because so many interrelated considerations other than decay enter to complicate such determinations. The control of decay is a complicated matter and can be brought about only through steady, long-time effort and by the application of suitable cutting methods. It will be much simpler in even-aged than in uneven-aged stands, because of the different methods of cutting necessarily involved.

A bibliography of 19 references adds to the value of the bulletin, as do 34 splendid photographic illustrations in the appendix. One could hardly desire a more comprehensive work.

Data Available on 1931 Cone Crops of Southern Pines

Estimates by more than 40 observers of the 1931 cone crops of the southern pines in different parts of their ranges have been brought together by an intersection committee of the Society of American Foresters headed by Philip C. Wakeley, of the Southern Forest Experiment Station. The estimates are expressed in terms of bushels of cones actually collectible by climbing or from felled trees. This information has been prepared for distribution in mimeographed form, together with lists of logging operations expected to be in progress in bearing stands, local collectors, and stands the high quality of which makes them especially desirable as sources of seed. Copies may be obtained by writing to Mr. Wakeley at 600 Stern Building, 348 Baronne Street, New Orleans, La.

Types of Humus Layer in the Forests of the Northeast

By L. G. Romell, New York State College of Agriculture

A paper by L. G. Romell and S. O. Heiberg appearing in Ecology, Vol. XII, No. 3, July, 1931, under the title "Types of Humus Layer in the Forests of Northeastern United States," represents a first systematic effort to apply outside Europe the principles and method laid down by P. E. Müller in his classical studies on natural types of humus layer. It is also a contribution to the classification and nomenclature of forest humus layers in general.

After a critical review of the different proposals of classification, the authors conclude that Müller's system fits the natural conditions best. That this holds true for American as well as European conditions is indicated especially by the flora characteristic of different types of humus layer. A fundamental point of Müller's system is that the classification applies to the entire humus layer (i. e., the top layer of the soil, owing its characteristic features largely to its humus content, no matter whether this content is high or low or whether the humus is "incorporated" or not). The authors strongly oppose the tendency inaugurated by Ramann to classify only the humus, which is but one constituent of the biological unit. Müller's two main types or groups are retained. They are characterized morphologically, as has always been done by the Scandinavian school, contrary to the tendencies in Germany, and some types with unincorporated humus are included in the mull group. Specific types listed are crumb mull, grain mull, twin mull, detritus mull, root duff, leaf duff, greasy duff, and fibrous duff. This list is not supposed to cover every variation possible; it is just an enumeration of conditions characteristic enough and occurring sufficiently regularly within the region to warrant their being recognized as types. The crumb mull is the classical prototype of the mull group, inhabited by large earthworms. The types greasy and fibrous duff have been taken over from the Danish forester Juncker.

The distribution of the types within the region is discussed. Ground-water conditions seem to be a particularly important factor locally. Some plants are listed as indicators of mull and of duff. The most valuable hardwood species of the region seem to be among the mull-preferring plants.

Data are presented on nitrification, pH, and lime content of the different types. Contrary to European experience, laboratory tests disclosed nitrification within all types, even pronounced duffs, and down to a pH of 2.9, which was close to the lowest pH value encountered in any sample, whether nitrifying or not. A great difference was found among the types, however; practically all the mull samples were nitrifying, whereas the majority of samples of pronounced duffs

were not. Storage tests yielded surprisingly high values for root duff and other intermediate forms as compared with the crumb mull, while inoculation tests gave results agreeing better with the expectations from previous experience and with the indications furnished by the vegetation. The puzzling results of the storage tests are ascribed to a "sampling effect" to be discussed in a later paper.

The main data are given in concentrated table form on eight pages. A mimeographed appendix of 29 pages, distributed by the authors, gives descriptions of 17 chosen localities including vegetation and soil notes, Bouyoucos analyses, etc.

Park Administration Booklet Holds Lesson for Foresters

By L. F. Kneipp, United States Forest Service

A forested area, as a rule, is a tract of land broken into varied relief by hills and valleys, traversed by rippling or roaring streams and gemmed with lakes and ponds, supporting a diversified cover of trees, shrubs, and flowering plants, and inhabited by a complex society of mammals, birds, fish, insects, etc. Its potentialities of social service are usually subject to a wide variety of interpretations. Foresters are disposed to regard it primarily as a source of timber supply; to the grazing man it means so much cattle or sheep feed; the engineer considers its availability for water storage in aid of hydroelectric power production, irrigation, or navigability; the nature lover insists upon a subordination of its economic uses to its inspirational or recreational aspects—and in consequence is frequently regarded as on the fringe of fanaticism, mild or extreme.

The fact that proper economic or industrial exploitation of natural resources is the basis of our social and cultural order can not be disregarded. A great population can not exist solely upon scenic beauty and nature interest. Nevertheless there is an obvious and growing need for forest areas open to the outdoor recreational activities essential to the well-being and contentment of large populations. It is now fully demonstrated that economic utilization need not be permanently destructive of natural beauty; and foresters must recognize the vast undeveloped opportunity to coordinate the strictly utilitarian and the inspirational phases of forestry if they are to perform adequately the social functions of their profession.

The suggestion that park standards be applied in the management of forest areas is apt to provoke extreme dissent and frequently may be impracticable. Nevertheless, foresters may derive from the experience of park administrators many ideas that will contribute to the establishment of forestry in its proper place in the future order of the Nation. A striking opportunity of this kind is afforded by the publication entitled "New York State Parks—1931," just issued by the Conservation Department of the State of New York. The facts and the record of progress which this booklet contains, its good arrangement and its beauty, make it highly valuable to the forester; but its chief value for him lies in the demonstration of the manifold ways in which forested areas may be made to contribute to human happiness and well-being. It has nothing to do with forestry, but to every forest administrator it should suggest the question: "In the management of the properties for which I am responsible, how far can I go in developing these important forms of collateral or supplemental social service which are going to mean so much to future generations and which will do so much toward the further justification of forestry as a proper form of land utilization?"

Forest Fires in Michigan

By J. R. Curry, United States Forest Service

In Forest Fires in Michigan, J. A. Mitchell and H. R. Sayre present the results of a detailed study of forest-fire records comparable to that which formed the basis of Mitchell's bulletin Forest Fires in Minnesota, published in 1927. This work has been published by the Michigan Department of Conservation in cooperation with the Lake States Forest Experiment Station. While Michigan's fire statistics, in common with those of most other States, are incomplete, and, prior to the last decade, decidedly inaccurate, the authors have used the available records to good advantage.

The earliest recorded fires in Michigan occurred in 1871, although presumably fires were common before that date. Fragmentary records only are available for the period from that date to 1910. From 1911 on, State reports contain forest-fire statistics that are inaccurate and untrustworthy for the early years but that gain steadily in reliability. For the period from 1922 on the State's fire statistics are considered reasonably accurate.

Some conception of the size of Michigan's fire problem may be gained by a study of the number of fires and the acreage burned in each of the past nine years. During that period the yearly total of fires reported has varied from 538 to 4,690 with a rough average of 2,250, and the area burned has varied from 38,480 acres (in 1922) to 733,750 acres (in 1925). Appropriations for fire-control purposes have increased steadily in the past 10 years. The funds available from the State and Federal Governments totaled $99,000 in 1923, but in 1930 amounted to $401,655.

Part I of the bulletin is entitled "Physical and Economic Conditions" and deals with topography, climate, weather, soil, forest types, land ownership, and values involved. Part II deals with the size and importance of the fire problem and presents an analysis of nearly 15,000 individual fire reports. Part III tells how the forest fire division of the Michigan Department of Conservation is organized at present.

Forest land in Michigan requiring fire protection totals 20,650,000 acres. Of this area only about 10 per cent is publicly owned. The destructible timber values involved total $300,000,000; the yearly cost of protection is estimated at $500,000, or less than 0.2 of 1 per cent of that figure. The fire season in the State extends from the time the snow leaves the ground in the spring until the heavy rains of the fall, roughly from April 1 to October 30. The peak months in fire-control work are May, August, and October.

Fires in Michigan are almost all attributable to human carelessness. Land clearing and smoking are the leading causes of fires, each being responsible for about 25 per cent of the total. Railroads are next in importance, with 19 per cent, and camp fires fourth with 17 per cent. Lightning causes less than 1 per cent of the fires; incendiarism is responsible for 4 per cent.

Four kinds of risk are recognized by the authors: Risk of starting, risk of spreading, risk of burning, and risk of loss. Here as elsewhere in forest-fire literature "risk of starting" means the relative likelihood of fires starting expressed as the number of fires per year per unit of protected area. Risk of spreading refers to the average size of fires. Risk of burning is obtained by dividing the average area burned annually by the total area under protection. Risk of loss is the average annual loss per acre on the basis of total area protected.

The risk of fires starting is nearly twice as great in the lower peninsula as in the upper. The risk of spreading is greater in the upper peninsula. The risk of burning is slightly larger in the lower peninsula.

The Michigan Department of Conservation, responsible for conserving forests, game, and fish, has divided the State into 20 districts, each under the charge of a district warden who acts as the department's local representative in all the phases of its work. Until 1927 the fire-control work consisted largely in fire suppression alone, the district wardens having too large an administrative burden to give much time to fire prevention. A change in policy was made in 1927 defining the work of the district wardens more specifically and requiring that they give more attention to fire prevention. At the same time one assistant warden was appointed in each of the 15 fire districts, with fire prevention and control as his sole responsibility. During the six or eight month fire season the State employs towermen, special fire wardens, emergency special fire wardens, fire bosses, and key men.

Special fire wardens receive a salary during their period of employment and are responsible for all prevention and suppression work within the areas assigned to them. In 1929 special fire wardens numbered 129 and the number of towers regularly manned by the division was 105, exclusive of towers on State forests.

Beginning in 1923, an experiment was made with the fire-boss plan of organization. Fire bosses were paid a retainer fee of $25 per month in addition to an hourly rate on fires. The fire suppression crew members under the boss were paid 40 cents per hour of actual fire work. At one time there were 39 such fire bosses, with 317 company members. Of late this type of organization has lost favor; in 1929 there were only 10 fire bosses. Michigan's experience with this form of organization is similar to that of other Eastern States. Wherever it has been tried, apparently, the expenditure of funds in retainer fees paid to nonsalaried wardens has not brought about a commensurate betterment of service.

Key men selected by the special fire wardens are assigned to the protection of small areas in the vicinity of their homes. They are not paid a regular salary but are paid on an hourly basis for actual fire-sup pression work.

In 1930 the organization was strengthened through the addition of another year-long fire man to each forest fire district, to assist in inspection and organization work.

The forest fire division maintains in cooperation with the United States Forest Service an experiment station for the study of all phases of fire control and of fire damage.

In presenting this picture of conditions in an important forest State the authors have made a substantial contribution to the growing literature on the forest-fire problem.

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The question "Whose property is wild game?" is dealt with historically in a booklet recently published by the game conservation department of E. I. du Pont de Nemours & Co. (Inc.), of Wilmington, Del., under the title "Wild Game—Its Legal Status." The book is a reprint of a report made to the Massachusetts Fish and Game Association by the association's attorney. Copies will be distributed by the Du Pont Co. without charge as long as its supply lasts.

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